Computer Anxiety and Computerised Assessment of Mood Change

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I hereby declare that this thesis is the result of research and composition solely by myself.

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ABSTRACT

Increasingly, the advent of the computer is showing itself in the area of clinical psychology. Not only is its use seen in the collection and manipulation of client record-keeping, but more recently applications have been developed for administration of many standard personality and mood questionnaires. This thesis examines the extent to which Human-Computer Interaction (HCI) factors influence the equivalence of computer-based testing (CBT) and conventional paper-&-pencil (P&P) questionnaires in the context of mood measurement. The assessment of mood discussed in this dissertation deals largely with variation in the affective state at a fixed moment or over a short period in time. This approach permits one to characterise what dimensions of feeling there are, the degree to which they are interrelated with each other, and allows an orderly search for individual characteristics associated with affective ratings.

Over 200 women volunteered to take either a CBT or a P&P version of mood assessment to test the hypothesis that accuracy of disclosure on sensitive issues is greater with a computer interaction. The CBT version showed heightened negative mood with respect to the phases of the menstrual cycle compared to the P&P administration. Heightened negative mood in CBT did not correlate with individual tendency to respond in a socially desirable way, nor familiarity with computer use.

The influences of item presentation factors on affective ratings was examined, by employing a card administration of mood assessment which simulated the CBT format as closely as possible in terms of item presentation and time-to-completion. Despite controlling for the above, psychometric differences in affective ratings were found between the two modalities. Item presentation format alone therefore does not account for the non-equivalence result.

Most previous studies examining between-modality equivalence have generally focused only on mean score or rank ordering comparison. This approach, although reasonable, is incomplete because it neglects the possible individual differences in responding with computerised situations. To investigate the relationship between individual characteristics and affective ratings, 108 volunteer subjects completed assessment of mood change in either the CBT or P&P format. Elated mood, as manifested by measures of self-reports and cognitive tasks, was successfully achieved with a self-statement mood induction procedure. As expected, self-rating of mood change from the two modalities correlated divergently with measures of individual characteristics. Affective ratings administered via CBT were found to correlate with the measure of "computer anxiety," but this was not so for the measure of "private self-consciousness." The converse relationship was revealed in the P&P format.

Between-modality equivalence of mood assessment therefore is not determined by computerisation *per se*, rather it is affected by the more complex interactions between individual characteristics (e.g. computer anxiety) and administration formats. Implications of these findings for the clinical application of computerised assessment are discussed.

CONTENTS

CHAPTER 1
COMPUTERS IN PSYCHOLOGICAL ASSESSMENT: A REVIEW

1.1 Introduction

The development and use of machines to replace human labour, wholly or in part, might loosely be labelled "automation." Automation has ancient origins and has been increasingly used very successfully over the past century. Although the gains and losses from the immense effect of automation are incalculable, automation is generally recognised as having freed humans from the bondage of repetitive work, allowing for greater precision and productivity, and increasing time for recreation.

The field of clinical psychology is not immune from automation. The criteria for increasing automation of tasks in clinical psychology are essentially the same as for other fields: any task that is routine and repetitive. The routine and repetitive activities range from data collection and processing to test scoring and even further to psychological intervention. Foremost among automation of these activities is the use of machines for psychological assessment (Butcher, 1985). An early attempt to automate psychological testing used a slide-projector system with control units, requiring touch responses. Because of mechanical rather than conceptual difficulties, the influence of this approach was limited and only a small subject population such as the elderly or mentally handicapped patients was tested (see Thompson & Wilson, 1982 for a brief description of these systems). The recent advent of microcomputer technology has reawakened interest in automation of psychological testing. Computers currently offer advantages for improving the efficiency of assessment through on-line test administration, accurate scoring, and immediate feedback via computerised graphics or printed reports (Skinner & Pakula, 1986). Furthermore, the microcomputer is capable of transmitting an extensive range of messages to a very wide audience. Such an evaluation of the microcomputer from tool to medium will

increase the impact of microcomputers upon psychological testing enormously (Frude, 1991).

The distinction between the computer as an apparatus and the computer as a medium is fundamental to a better understanding of what influences computers will bring to psychological testing. To appreciate this, it is perhaps useful to draw an analogy with the development of telephone use. The impact of the telephone on human communication cannot be fully understood by only considering the telephone as a technological apparatus. It is the content and context of the telephone medium, such as its lack of social cues, which influences the nature of human communication via the telephone (Rutter, 1987). Similarly, it is the assessment context involved with the microcomputer as a medium, rather than the microtechnological apparatus itself, that governs its impact upon psychological testing.

As an apparatus, the efficiency gains and advantages of computer use in clinical psychology may grow mainly as a result of the advances of microtechnology. For example, the most discussed disadvantages of computer-based testing (CBT) in the 1960s and 70s were financial costs, the requirement of expertise in operation, and the inflexibility and incapability of producing the fine graphic details required (Denner, 1977; Miller, 1968). These disadvantages have been largely remedied by recent developments in microcomputer technology.

As a medium, the computer has been proposed as being a socially cueless medium in which clients are more willing to disclose the sensitive aspects of their personal lives, especially since on-line testing becomes available (Evan & Miller, 1969; Koson et al., 1970; Smith, 1963). Other issues concerning individual differences of interacting with this medium, were not really addressed before the 1980s. These Human-Computer Interaction (HCI) issues are recurrent and less affected by the advances of microtechnology.

The purpose of this chapter is to provide an overview of the literature concerning the current advantages and limitations of computer use in psychological testing. The primary focus views the computer as a medium, rather than merely as a technological apparatus. To appreciate the computer as a medium, a major portion of this chapter is devoted to discussing the equivalence of CBT versus conventional tests such as Paper-&-Pencil (P&P) questionnaires and face-to-face interviews. Theoretical concerns and prospective work for this field will be discussed.

1.2 The Computer as an Apparatus

The role of the computer in clinical psychology is assumed to include data storage, automation of standard clinical techniques, and the development of new techniques designed particularly for the clinical use of computers. As suggested by Ager (1991), there are three distinct ways in which the microcomputer can assume a role within clinical psychology. The first is when the application essentially involves a technical *elaboration* of existing practice. Here, the computer is used to accomplish tasks in much the same way that they would have been accomplished manually. Tasks such as scoring or client record collection systems can be automated and accomplished more efficiently, or perhaps more elegantly by the computer than by existing manual methods. In the second role, the computer actually *emulates* the previous work of the clinician. Much of the contemporary use of automated assessment and instructional programming application would fit into this category. Furthermore, computers can be used in an *innovative* way to aid the development of new assessment strategies instead of simply mimicking established testing procedures. Computer use for the emulation of existing tests and for the development of innovative assessment strategies is discussed in turn.

1.2.1 Emulation of Existing Psychological Testing

By the 1960s, some investigators were already exploring the feasibility of automated test administration. The on-line tests presented items via a computer monitor and permit the subject to respond with a keyboard. Most of the computer administered tests of that time were limited to structured personality tests in which the response-type was well-defined. Open-ended questions would be almost impossible to score and interpret directly by computers (Fowler, 1985). More recently, a wider range of tests have been automated because the advancement of microcomputer technology and software design. In addition to the objective personality tests (Butcher et al., 1985), contemporary developments of CBT have been introduced in the recent literature, including clinical interviewing and self-reports of psychiatric symptoms (Erdman et al, 1985; Fowler et al., 1987), neuropsychological assessment (Adams & Heaton, 1987; Golden, 1987), and cognitive tasks (Fairbank et al., 1991).

The advantages of CBT cited in the literature consider a reduced cost and a reduction of the psychologist's direct involvement in scoring and test administration. CBT may also increase reliability and validity of testing results because of standardised testing procedures. Although there is a large variety among CBT in ways of presenting question items, most software is designed to present items one or a few at a time so that the respondent has no way of browsing other items before answering. The software design also often requires a response to each item before continuing with the next, thus the number of valid protocols can be increased as the computerised procedures compel a respondent to answer all the items. In the light of testing procedure standardisation, CBT administration provides not only the same function as its manually administered counterparts, but also may be in fact superior (Hofer & Green, 1985; Lockshin & Harrison, 1991; Moreland, 1987).

A major concern regarding CBT is that extraneous factors incidental to the computerised administration may affect test performance. The HCI factors may

change the construct of a test which is devised to be administered conventionally, so that one may not be able to say that both versions are measuring the same construct. Unless the issue of equivalence is empirically established, the well-documented reliability, validity, and normative data in the conventional form of a test can not be generalised to allow interpretation of the data obtained in the computer version. A number of plausible HCI factors have been proposed to account for the way in which CBT differs from its conventional counterparts. These include emotional reactions and lack of computer familiarity on the part of respondents and changes in test format required by computerisation (Hofer & Green, 1985). The cross-modality equivalence issues will be discussed in detail later in this chapter.

1.2.2 Innovative Use of Computers

There are several areas in which the computer may offer its flexibility for developing unique and new assessment strategies. One such capacity is instant decision making that allows dynamic assessment. For example, adaptive and individualised testing procedures can be achieved by the CBT administration, and reaction time can be easily measured by CBT.

In an adaptive test, item responses are related by a probability function of known difficulty and discrimination, to an underlying ability or trait. After each response, the next item is selected to improve this estimate. Once an estimate of high psychometric quality has been achieved, no further items are presented (Skinner & Pakula, 1986). Computerised adaptive tests have demonstrated substantial advantages over conventional tests. These techniques offer the potential for gains in efficiency by tailoring tests to the individuals taking them, rather than to an entire group of potential subjects. They also share the object of minimising test length while maintaining high standards of reliability and validity (Sanders, 1985; see Butcher et al., 1985; Weiss, 1985 for reviews).

The combination of the computer's data storage capacity and its flexibility of dynamic assessment offers the possibility of developing ideographic testing which is unique to an individual. The data storage capacity of a computer allows real time monitoring of an individual's data over a length of time, and updating of scoring and interpretative strategies in the light of new data. Cliffe (1985) reported how the microcomputer can be used to implement an individualised test. A female client's clinically relevant personal experience was repeatedly assessed via a computer over about 15 months. The graphic output produced by the computer showed that her score of self-reported depression covaried with the severity of her marital problems across time. Data derived from the tests are useful in helping this client to understand the reasons for her experienced depression and to develop strategies for coping.

Another innovative use of computers explores their capabilities to register certain data unavailable to traditional assessment, such as response latencies, key-press duration, the number of times items are reviewed, and other test-taking behaviours. Such ancillary measures may be correlate with test responses in a search for patterns (Weinman, 1982). The response latency associated with a particular item may provide important data to be used for conducting extra validity checks for self-reports of mood (Gilbert, 1967; Ryman et al., 1988; Temple & Geisinger, 1990) or personality scales (Popham & Holden, 1990). This potential, however, should be viewed with caution because of the ambiguities of incidental test behaviour in some cases. As pointed out by Skinner & Pakula (1986), the computer "won't tell you whether the latency was due to the client pausing to sneeze, falling off the chair, or seeing visions of Christ on the terminal!" (p. 47).

1.2.3 Summary

The computer appears to be a perfectly satisfactory apparatus for a wide range of psychological testing, not just in elaboration and emulation of existing clinical tests but also in its potential for the development of innovative test construction.

Despite being an effective apparatus for clinical psychologists, the computer may serve as a medium through which clients respond in ways that are different from more conventional testing contexts. Several recurring issues concern the influence of the computerisation upon psychometric properties of a test and a client's responses. These include: what changes in psychometric properties (reliability, validity, response styles) can be expected when a computerised version of a test is developed?; What clients' characteristics are most important in facilitating/hindering assessment by the computer?; Does the computer make special demands on the client? From a general perspective, some of these HCI issues have been empirically examined in the area concerning cross-media comparability.

1.3 The Computer as a Medium: Cross-Media Comparability

Much of the current discussion of cross-media comparability is concerned with transcribing conventional tests into computerised formats. Software developers have made the assumption that the computerised version is an equivalent form to that which has been standardised in a conventional mode. This assumption has been challenged by several authors who contend that research has not established the computer-conventional equivalence conclusively (Hofer & Green, 1985; Honaker, 1988).

With respect to cross-media comparability, Honaker (1988) outlined three criteria which enable one to determine that two forms of a test are parallel: psychometric equivalence; experiential equivalence; and relativity of equivalence. Among them, psychometric equivalence has traditionally been the primary focus in determining cross-media comparability. Psychometrically, two forms of a test are

considered equivalent if it has been demonstrated that they produce equal scores, identical distribution and ranking of scores, and correlate to the exact same degree with scores on any other variables. Experiential equivalence concerns whether two forms of a test differ in how they are experienced by the respondents in ways that may affect both psychometric and non-psychometric components of the evaluation process. Factors involved in experiential equivalence include emotional, perceptual, and attitudinal reactions of a respondent to administration formats. Relativity of equivalence refers to the interaction between absolute characteristics of test formats and individual subject characteristics. For example, lack of previous experience with computer use may have an adverse impact on responses to CBT but not to its conventional counterpart.

In addition to these criteria, test construct is an important factor in determining cross-media comparability. Traditionally, the fundamental distinction in psychological tests separates ability tests, by means of which one determines what a person can do, from personality tests, by means of which one determines what a person feels, wants, or worries about (Tyler & Walsh, 1979). It is not surprising that the latter have produced more variant cross-media effects than the former because of the widely held belief that responses to the latter have more complex determinants.

Among the studies that have examined specific tests, the largest number of studies have focused on the psychometric equivalence across media, especially mean score comparison. The HCI factors which influence experiential equivalence and relativity of equivalence are, however often less addressed (Honaker, 1988). The current section aims to provide an overview of the literature in the area of cross-media comparability, with specific focus on the HCI factors which contribute to cross-media difference.

1.3.1 Ability Tests

An ability test is constructed to determine what a person can do at a specified time, and it can usually be divided into the measurements of either power or speed. An idealised speed test imposes stringent time limitations and so the test attempts to measure processing speed. Almost all examinees would be expected to obtain perfect scores if they were given sufficient time. An idealised power test assesses an individual's ability in some content area with no regard for how quickly items are answered (Mead & Drasgow, 1993).

The distinction between speediness and power in ability tests is particularly important in cross-media comparability. In a recent review, Mead and Drasgow (1993) conducted a meta-analysis concerning the equivalence of CBT and P&P administration of ability tests. Their analyses revealed that speed tests appeared to be affected by the mode of administration, but little medium effect of administration was found for power tests. The most plausible explanation for the relatively low between-modality correlation for speed tests, as suggested by Mead and Drasgow, is their dependence on an interaction between perceptual processes and physical responses. Computerisation of such tests from the P&P format usually alters both item presentation and response devices. For example, reading from a piece of paper and using a pencil to fill a bubble on another piece of paper evidently constitute different motor activities than do reading from a monitor and pressing a key.

Most data indicate that any cross-media nonequivalence of ability tests, if present, is due to the differences in item presentation and response format. The available evidence suggests that cross-media dissimilarities may be reduced or eliminated if the test does not require a change in response format for the CBT administration (Mead & Drasgow, 1993; Moreland, 1987).

1.3.2 Personality Tests

The measurement of personality characteristics and self appraisal involves some special problems in comparison with the measurement of abilities. Unlike the ability tests, the strategy of placing a respondent in a standard situation in which the actual sample of personality traits and behaviours will be most likely to manifest themselves is not feasible. Therefore, test developers have usually adopted self-reports as a substitute for observed behaviour, and this approach has produced the many personality questionnaires and self-report inventories we find in frequent use today (Tyler & Walsh, 1979).

The method of substituting self-reports for observed behaviour carries some testing problems unlike those encountered in ability measurement. The history of self-reported testing indeed can be viewed as a series of efforts to solve these special problems. Perhaps this is why several researchers (Evan & Miller, 1969; Koson et al., 1970) were inspired, as soon as on-line CBT was feasible, to examine the hypothesis that respondents might be more willing to provide "confession-type" information of a sensitive and personal nature in the CBT administration (Smith, 1963).

A number of investigations have demonstrated that the computer, in obtaining self-evaluative information such as psychiatric symptoms for diagnostic purposes, is at least as reliable as that of mental health professionals (Blouin et al., 1988; Carr & Ghosh, 1983; Lewis et al., 1988; Wilkinson & Markus, 1989) or the use of questionnaires (Glaze & Cox, 1991; Gonzalez, 1993; Maruff et al., 1994; Swanston et al., 1993). These studies had in common using the application of correlation designs, thus their results suggested that the ranking of scores obtained in CBT is comparable to those measured by conventional administration formats.

However, there is a growing body of literature which suggests that there are mean score differences between face-to-face and CBT-administered interviews,

especially if the subject matter of the questioning is personal and sensitive. In general, most of empirical studies have shown that people tend to be more willing, or less inhibited to deal frankly with sensitive materials when interacting with a computer than they are when talking with a human interviewer. Problem areas of a sensitive and personal nature have been empirically investigated including those concerned with sexual behaviour or gynaecological health (Slack & Van Cura, 1968), alcohol or tobacco consumption (Lucas et al., 1977; Waterton & Duffy, 1984; but c.f. Bernadt et al., 1989; Skinner & Allen, 1983 who found no cross-modality difference), and psychiatric symptoms or complaints (Carr & Ghosh, 1983; Erdman et al., 1987; Lewis et al., 1988).

The hypothesis that accuracy of disclosure on sensitive issues will be greater with CBT has also been examined by comparing the outcomes with those measured in P&P format, but more varied results have been obtained. Lending credence to this hypothesis are the findings reported by Evan & Miller (1969), in a between-group comparison in which subjects completed a questionnaire composed of highly personal and neutral items, administered in either CBT or P&P formats. Subjects in the CBT group admitted more symptoms of manifest anxiety, told fewer lies, and demonstrated a greater willingness to agree to socially undesirable statements than did those in the P&P group. The authors argued that CBT administration may enhance the perception of confidentiality and consequently lead to a less biased responding. A similar study by Koson et al. (1970) revealed marginal support for differences between both testing modalities on items designated as "threatening" or "defensiveness." The modality effect was more significant for their female subjects. As females are often reported to have more negative attitudes towards computers (see Brosnan & Davidson, 1994 for a review), the interaction of gender and modality effects may imply that attitudes towards CBT influence the between-modality equivalence.

The hypothesis has also been examined in the area concerning self-report of symptoms and mood states. George and his colleagues (1992) reported a significant effect of medium on self-reported intensities of depression and state anxiety. Their results showed the importance of individual differences in computer anxiety, which might interact with administration format and thereby to produce between-modality nonequivalence.

The results from equivalence studies concerning structured personality tests, especially the Minnesota Multiphasic Personality Inventory (MMPI) are inconsistent. In a critical review of the equivalency of computerised and conventional booklet MMPI administration, Honaker (1988) concluded that a consistent finding in studies that have reported correlation between conventional and computer administration is that the rank ordering of individuals can be reasonably well maintained across modalities. However, in regarding the mean score differences, at least six of the nine studies conducted in the area have found significant differences on one or more scales across the two modes although there has not been consistent variance in the scales which were affected by mode differences. It is not clear if CBT administration produces changes in most, some, or none of the MMPI subscales. Stockwell & Jackson (1983), as cited in Skinner & Pakula (1986), compared the contribution of stylistic (social desirability and quiescence) and content components of variance for CBT and P&P administered personality scales. Some small differences in scale means were found, although factor structures for the two modes were quite similar.

Clearly, any conclusion concerning the CBT-P&P equivalence has to be tentative at present because of inconsistent results. There is evidence that respondent's attitudes toward, and affective reactions engendered by, CBT may contribute to cross-modality differences (e.g. George et al., 1992; Koson et al., 1970). Individuals who respond to CBT negatively (e.g. showing increase in anxiety) may be more likely to show nonequivalent results across administration modalities. Studies in this area

thereby need to take individual differences related to administration formats into account.

1.3.3 Summary

There is support for the idea that the content and nature of a test function as a moderator for cross-media comparability. There are no greater differences for tests which are not dealing with sensitive material, so long as the subjects are familiar, and comfortable with the testing procedures and no major differences in format such as item presentation or response recording.

People tend to be more willing to deal frankly with sensitive material when interacting with a computer than when talking with an interviewer. The notion that uninhibited behaviour is associated with communicating via a computer has also attracted a great deal of attention in recent studies of computer-mediated communication (CMC). The evidence derives from observations that computer users frequently show a greater tendency to display uninhibited behaviours such as using offensive language and being interpersonally insulting with hostile expression of strong feelings in the CMC context (Kiesler et al., 1984; but see Lea et al., 1992 who argued that it is actually a rare occurrence under careful examination).

In comparison with P&P questionnaires, the data regarding the issue of the disclosure of sensitive information are equivocal . This may be due to the facts of no differences between these two modes in terms of social cues. Studies that did find negative affect associated with CBT also found significant between-modality differences (e.g. George et al., 1992), indicating that there may be other HCI factors which are important in determining the between-modality equivalence but have not been properly addressed in previous studies.

1.4 Experiential Equivalence

The experiential differences between the CBT and conventional format of a test include affective, perceptual, and attitudinal reactions of the respondent towards the administration modality as well as the changes in test formats required for computerisation.

1.4.1 Effects of Item Presentation and Response Devices

The conventional psychological test requires the respondent to make a written or verbal response to either a textual or pictorial stimulus presented on paper or a verbal stimulus given by the test administrator. When the same content of a test is administered via a computer, both response requirements and presentation formats are changed. Usually, the response involves a key or mouse press and the stimulus is presented on a Video Display Unit (VDU).

The differences in item presentation across modalities may affect assessment processes. Askwall (1985) examined the effect of presentation formats on performance for a reasoning task by comparing reading text on a VDU and on paper. The only significant between-modality difference was that the way information was searched when the texts were presented as separate sentences, while reading speed and accuracy of judgement were unaffected by presentation formats. The VDU presentation may also lead to fatigue and stress, which in turn may decrease performance especially when the length of a test is long (see Waern & Rollenhagen, 1983 for a review).

Options of response devices are likely to affect equivalence. Several authors (Beaumont, 1985; Carr et al., 1986; Skilbeck, 1991) have suggested that using a keyboard as a response device should be avoided because its use requires too much information to be processed, and the risk of error input is high. Alternative devices such as a mouse or touch-sensitive screen are preferred because they facilitate

interaction with the computer. However, as noted by French and Beaumont (1987), although the touch-sensitive screen was preferred to the keyboard in simple tests, in other cases prior experience with the keyboard may facilitate the performance.

The construct of a test is likely to modulate the effect of item presentation and response devices upon assessment processes. As cited before, Mead and Drasgow (1993) concluded that the relatively low between-modality correlation in speeded ability tests results from the importance of devices for response recording in these tests. Another example comes from the consistent findings that the automated version of the digit span test produces lower scores than the standard versions (Beaumont, 1985; Beaumont & French, 1987; Wilson & McMillan, 1991; S. L. Wilson et al., 1982). The lower profile obtained via computers is likely due to changes in response devices from verbal to motor response, as well as the presentation of stimuli from the auditory to the visual modality.

1.4.2 Attitudes towards Computerised Assessment

The current literature suggests that individuals in either the clinical or normal population generally respond favourably and show acceptance of CBT (French & Beaumont, 1987; Lewis et al., 1988; Lucas, 1977). French & Beaumont (1987) examined a large sample of psychiatric patients' attitudinal reactions towards the CBT and P&P administration. Their results indicated a positive attitude towards the test administration and completion for both test formats. Where differences existed, the CBT versions were found more enjoyable, especially in the case of simple tests, but were reported to be less comprehensible and less clear in the case of complex tests. The reactions and attitudes of subjects towards CBT may be influenced by other HCI factors, such as the complexity of task requirements, the application of different response devices, and respondents' previous experience with computer use.

Whilst individuals generally accept and favour CBT, it is clear that there are group differences for such attitudes. These may be cast in terms of age or gender differences. Males are reported to give more favourable ratings towards CBT than do females (Lucas, 1977; Skinner & Allen, 1983), but some found no gender differences (Newsted, 1985). Older subjects perform less well in CBT administration (Carr et al., 1982) or report less favourable ratings than does younger generation (Newsted, 1985; Paperny & Starn, 1989). Other studies suggested that the attitudinal reactions towards computers were influenced by age, education level, and socio-economic status. (Spinhoven et al., 1993).

Although the study of respondents' attitudes is important in determining experiential equivalence of assessment devices, a group difference approach to the study of equivalence may be misleading (Hofer & Green, 1985). Not every group member will be uniformly affected by taking CBT so that averaging across group members to determine male-female or youth-senior differences may obscure the more important information. Mere group membership is likely to be a very imprecise predictor of non-equivalence and sheds no light on possible psychological dimensions of which age and gender correlate to the between-modality equivalence.

1.4.3 Familiarity

Familiarity or sophistication with a psychological instrument refers to the extent to which a person may have experience with a particular test and hence is aware of the general nature and procedure in use. Familiarity with a setting for a particular test may have effects on an individual's psychological connotations for such a setting (Moscovici, 1967). In general, individuals who are familiar with the content or setting of a test have an advantage in that they might apply test taking skills or "test-wiseness rules" as well as being relatively free of negative feelings such as anxiety and fear, in contrast to those who are naive concerning a given test.

Although the influence of individual experience with computer use on test-taking performance may seem apparent, researches examining the direct effects of familiarity are scanty. Adrianson & Hjelmquist (1993) examined the effect of familiarity with a communication medium for the retention of texts presented by verbal or computer-mediated written form. The experience level clearly influenced the interaction results, and inexperienced users were found to act differently between the two media.

Experience with computer use has been found to correlate with educational level, gender, and socio-economic status (Spinhoven et al., 1993), thereby any nonequivalence across media due to unfamiliarity might appear psychometrically as poorer performance by some groups (Carr et al., 1982; Johnson & White, 1980). Such poor performance as a result of familiarity with computerised procedures appears to be well controlled by providing an adequate practice to make subjects familiar with the computerised procedure before test administration. Johnson & White (1980) found that elderly people who received one hour of training in the use of a terminal prior to an intelligence test, scored significantly higher than did those who received no training. Their results indicate the importance to ensure that all the subjects are familiar with the equipment and procedures when using a CBT format, so that they can devote their full attention to the substance of the test items.

1.4.4 Computer Anxiety

There is increasing evidence to suggest that subjects experience a relatively higher state anxiety associated with CBT administration than with conventional ones. Hedl et al. (1973) examined their respondents' affective reactions towards computerised intelligence tests. In each session, subject's attitudes and anxiety reaction towards CBT were measured before and after each intelligence test. State anxiety scores were found to be higher in the CBT situation than in the examiner testing condition. Similarly, Lushene et al. (1974) reported that CBT administration

initially was somewhat more anxiety provoking than was a conventional personality questionnaire.

In addition, nearly one-quarter to one-third of the population, who can be characterised as suffering to some extent from computer anxiety or computer phobia, have persistently experienced strongly negative emotions whenever they use computers (Rosen et al., 1987). While there are many definitions of computerphobia, the most commonly cited is the one proposed by Jay (1981) who defined computerphobics as people who often show a resistance to talking about or thinking about computers, fear or anxiety toward computers, and hostile or aggressive thoughts about computers. The behavioural, emotional, and attitudinal components he identified have influenced others conducting research in this area. Rosen et al. (1987) suggested that there are three nearly independent dimensions of computerphobia - computer anxiety, computer attitude, and computer cognition. Computer anxiety is more relevant to the present discussion because it involves a more affective and personal response when directly working with a computer. Computer anxiety has been assessed and exemplified in a variety of ways, e.g. by physiological changes such as blood pressure and heart rate (Powers, 1973 cited in Glass & Knight, 1988); by altered cognitive function such as the focusing on negative thoughts and evaluation (Glass & Knight, 1988); or by the domination of negative feelings such as anxiety, fear and apprehension when working with computers (Heinssen et al., 1987; Loyd & Gressard, 1984).

Negative feelings such as anxiety and fear elicited by the computer may inhibit, retard, or otherwise disadvantageously affect test performance (see Eysenck, 1992; Levitt, 1980). Messick (1985) brought together most of the research literature concerning the effects of affective variables on psychological assessment. Negative affect, such as fear or anxiety, leads to interference of function and disruption of cognitive processing flow. Persistent and intense affect can lead to a simplification of

conceptual responding, heighten polarisation and extremity of judgement, or bring about pre-emption of attention and processing resources. Indeed, Glass and Knight (1988) reported that computer anxious people are more likely to focus on their negative thoughts and have lower expectation of successful HCI when interacting with a computer.

Thus, computer anxiety may be one of the most important sources of extraneous variance incidental to CBT administration which may adversely affect test performance. George and his colleagues (1992) found a significant correlation between computer anxiety and the self-reported severity of depression measured in the computerised version of the Beck Depression Inventory, but failed to show a significant correlation in the P&P version. The results addressed the importance of the interaction effect between individual characteristics of computer anxiety and administration formats upon assessment processes.

1.4.5 Summary

Several HCI factors affecting cross-media equivalence have been reviewed. There is suggestive evidence that the computer-user interface for a particular test may have an interactive effect on test performance. Although some information relevant to these issues can be gleaned from HCI research, it is worthy of noting that the goal of software development may be somewhat different in the area of equivalence study. Most HCI research is designed to evaluate how to optimise the ease-of-use of the computer for input and retrieval of information. With respect to cross-modality equivalence, the goal is to make the CBT and conventional administration equally easy or difficult.

People often report positive attitudes towards CBT, and rate the approach as acceptable as conventional assessment. However, most of the studies have focused on individuals' attitudes towards test modes rather than to consider any possible direct

effects of such attitudes upon the cross-modality equivalence. Such an approach may contribute to understanding the feasibility of CBT, but it says nothing about the equivalence issue.

There are data to support that individual differences such as computer anxiety and familiarity with computer use are likely to affect the relativity of equivalence, but only a limited amount of research has examined such individual differences which may interact with test modality. It is clear that additional research is needed with particular emphasis placed upon what individual differences may interact with the mode-of-administration, thus affecting the equivalence.

1.5 Theoretical Concerns

Despite the bulk of empirical work either demonstrating equivalence or not, there is a noticeable absence of theoretical concerns about the cross-media equivalence. Theoretical development is important because it may stimulate research towards the better understanding of the psychological process underlying the outcomes of computerisation.

The interactions between a respondent and a computer in a setting of computerised assessment may, in a manner of speaking, be thought of as conversations (Chapanis, 1971). They are characterised by commands, statements, questions, answers to questions and other messages that go from the person to the computer and vice versa. For all practical purposes, these interactions are currently written or, to be precise, typewritten messages produced by some sort of input/output devices. However apt it may be to say that HCI is a conversation, it is fair to add that for most people the channels of communication between human and computer are highly limited and require thought patterns and processes that are unfamiliar and unnatural in comparison with daily face-to-face human communication.

The relative unfamiliarity and/or limitations of communication channels may be important features of computer-mediated contexts which contribute to cross-media comparability. As reviewed above, there is evidence to suggest that individuals can be less inhibited about discussing problem areas of a sensitive nature and provide more accurate information about these difficulties than they would in conventional contexts. Such findings imply that the aspects of self under examination may be selectively attended to by virtue of the situational cues that the particular experimental context evokes, thus producing some non-equivalent results of self reports across testing modalities.

It is therefore feasible to consider the outcomes and theories of situational mediators upon the self-report process. Central to the effects of situational mediators (e.g. a computer) upon self-report processes is the importance of attention. One important characteristic of attention, especially for the present purpose, is a relatively fixed-capacity of attentional processes. Capacity limitations will inevitably lead to cue competition, and frequently to selectivity in processing. This assumption suggests that there is a "mutual antagonism" existing between the focus upon internal information and focus upon the environment, i.e. as attention outward increases, inward attention presumably diminishes, and vice versa. Furthermore, the relationship between these two states are related not only in the simple matter of degree but also in specificity. Attentional shifts between the environment and self are guided by the cue implications provided by the most recent object of scrutiny (Matthews et al., 1982).

In the broad framework of attention, two conceptual variables have been applied to account for the notion of the increased accessibility of self information by virtue of situational cues: i.e. arousal and self-focused attention. The similarity between both conceptual variables is that they can both be manipulated by situational stimuli such as using a mirror to increase self-focused attention (Duval & Wicklund, 1972) versus a

TV camera for arousal (Cohen & Davis, 1973). In addition, both variables have been proposed as an explanation for the increased accessibility of salient self information under assessment. The fundamental difference between both variables, nevertheless, is the direction of attention. Arousal is usually indicative of attention being distracted towards the environment or a preoccupation with some other behaviours, while self-focused attention enhances the awareness of the self-dimensions in question (see Gibbons, 1990).

Drawing an analogy with a TV camera or a mirror, computer use in psychological testing may be perceived by an individual as a situational cue to draw attention inward or outward, and subsequently influences self-reporting processes. In the following sections, the possible extension of each of these conceptual variables to accounting for the findings concerning the cross-media nonequivalence as explored above is discussed.

1.5.1 Arousal: A Micro Camera

Revelle & Loftus (1990) suggested that arousal is a conceptual variable which has different meaning to different researchers. Several factors have been shown to influence arousal. Typical examples include situational manipulations of arousal such as noise, bright lights, time pressure, external distracters, complex stimuli, evaluation apprehension, or the presence of others; natural variations in arousal as a function of circadian rhythms (e.g. time of the day; see Thayer, 1989); individual differences in arousal such as outlined in Eysenck's theory of Introversion-Extroversion (Eysenck & Eysenck, 1985).

The influences of arousal on self-evaluation processes have been discussed by Paulhus & Lim (1994). A "dynamic complexity model" was offered to explain the effects of arousal upon retrieval of social and self information. The most important feature of this model is that emotional stressors tend to reduce the complexity of

information processing, and subsequently increase evaluative extremity of judgements. Reduced complexity may be seen as a result of reduced working capacity, cue selectivity, or distraction. Evidence from variant sources suggests that under pressured conditions, the complexity of judgements gradually reduce from many cues down to the most salient ones (Paulhus & Lim, 1994). Similarly, with respect to symptom reports, Pennebaker (1982) suggested that very high or low arousal level may be a prerequisite for accurate symptom perception.

Can a computer be viewed as an arousal-provoking stimulus? As reviewed previously, CBT administration is found to be more anxiety-provoking, especially to individuals who are less familiar with computer use or characterised as suffering from computer anxiety. Thus through increasing emotional arousal, CBT administration may yield non-equivalent results from those measured conventionally.

1.5.2 Self-Focused Attention: A Micro Mirror

It is not my present purpose to provide a full review of the literature nor to extensively describe most of the specific sets of issues in self-awareness theory which have been recently examined thoroughly by Gibbons (1990). The present section will focus the discussion upon how a computer can be viewed as a situational cue to alter a person's momentary level of self-attention as well as how increased self-attention influences self-reporting processes.

Self-awareness theory was first introduced by Duval & Wicklund (1972). Since that time, the theory has been modified several times and still continues to generate a considerable amount of research. The theory has also spawned several related, but distinct, alternative models (Carver & Scheier, 1982; Hull & Levy, 1979). Nevertheless, the original theory proposed that attention is bi-directional and can be directed towards the self by any stimuli which remind persons about themselves. When an individual's attention eventually gravitates toward whatever self-dimension

has been made salient by the situation, the self evaluation process about that self-dimension will begin. There are behavioural, cognitive, and affective consequences of directing attention toward a salient self-dimension. One of the consequences, especially pertinent for the present purpose, is that cognisance of that particular self-dimension is increased. Evidence of this cognisance can be seen, for example, in greater consistency between self-report and behaviour, in exhibition of more extreme emotions, and in more accurate self-reports (see Gibbons, 1990, for a review).

Duval & Wicklund (1972) argued that any stimulus that directs attention back on the self is capable of inducing a state of self-focus. They operationalised this reasoning with manipulations that seemed intuitively to serve as reminders of the self: stimuli such as mirrors, cameras, and tape-recordings of their subjects' voices. Later studies provided evidence that such experimental manipulations may differ dramatically from each other in terms of the aspects of the self to which they guide attention. Specifically, these findings seem to show that some manipulations, such as the use of mirrors lead mainly to awareness of private self-aspects and that manipulations using cameras and audiences may serve primarily to increase arousal and direct attention towards public dimension of self (Carver & Scheier, 1982).

As reviewed above, computerised assessment differs from conventional methods, for example providing a more accurate estimation of alcohol consumption, or a less inhibited self-report of personal and sensitive materials. Such outcomes ally with the empirical findings and predictions of self-awareness theory. It is, therefore, not illogical to reason that the computer may serve as a stimulus as does a mirror, to increase self-focused attention in the assessment context.

Such an analogue is not completely unfounded. Specifically relevant to this argument is the growing literature within the area of Computer-Mediated Communication (CMC). Several authors (Matheson, 1992; Siegel et al., 1986; Spears & Lea, 1992) argue precisely for a heightened self-consciousness within CMC - an

assumption supported in other empirical work. Matheson and Zanna (1988), for example, compared self-reported levels of self-awareness following face-to-face versus computer-mediated interactions. Their results suggested that, relative to the face-to-face group, computer users were more aware of the covert aspects of themselves, such as personal feelings, attitudes, values and beliefs (i.e. the private self), although they were less aware of the overt aspects of self which were sensitive to evaluation by others, such as physical characteristics (i.e. the public self). However, Kiesler et al. (1984) argued that CMC seems to comprise some of the conditions that are important for de-individuation, and found CMC to reduce self-awareness. Spears & Lea (1992) developed a model to account for the conflicting findings in CMC and proposed that physical isolation associated with CMC lead to visual anonymity and increased private self-awareness. Following self-attention theory, they argued that the effect of this will be to heighten the person's awareness of already salient identities and their accompanying norms or standards.

The controversy regarding the impact of CMC on self-awareness may thereby imply that such a relationship is modulated by the interaction between individual differences and communication media. Nevertheless, evidence from these studies suggests that CBT administration may influence one's self-focused attention, and yield non-equivalent results when compared with a conventional format.

1.5.3 Summary

Two variables, i.e. self-focused attention and arousal, are conceptualised to influence the equivalence of CBT and conventional administration. How CBT administration influences attentional direction is largely dependent upon individual characteristics relevant to the administration format. Personal involvement within the HCI context appear to range from negative feelings to positive emotional bonds. Subjects characterised as suffering computer anxiety may experience high arousal

when interacting with a computer. In contrast, others characterised as computer-dependent may perceive the computer as an "intimate machine" (Frude, 1983). Individual differences are likely to interact with administration modes, thus influencing the direction of attention.

1.6 Conclusion

Microcomputers have made computerised assessment feasible for most clinical, educational, and personnel settings. As an apparatus, the computer offers possibilities for technical elaboration and emulation of existing psychological tests. In addition, special features of microcomputer technology, such as dynamic decision making, graphics, and rapid computation, can be used in innovative ways to create fully integrated assessment.

Research on the cross-modality equivalence, however, points to the fact that computerisation of existing tests may produce different results from the conventional counterparts. The findings that people tend to be less inhibited about discussing problem areas of a sensitive nature in CBT, suggest that the equivalence may be mediated by the content and construct of a particular test. Other HCI factors may also influence cross-modality comparability, but are less addressed in previous studies. These include the nature of the computer-user interface such as item presentation and response devices, as well as affective and attitudinal reactions towards computer use on the part of the respondent. The review also suggests that there is a noticeable absence of theoretical discussion of how computerisation affects self-reporting processes. Two conceptual variables, arousal and self-focused attention have been proposed in this chapter as theoretical constructs to account for the findings in the area of cross-media equivalence.

This dissertation represents an attempt to investigate the possible interaction effects between individual characteristics and administration modes upon self-

reporting processes. The primary focus is upon computer applications for the assessment of mood change and internal sensation states, in comparison to those measures by P&P questionnaires. A number of experiments are reported which examine the possible effects of HCI factors upon computerised assessment in the light of the empirical and theoretical concerns as discussed above.

CHAPTER 2
THE NATURE AND MEASUREMENT OF MOOD CHANGE

2.1 Introduction

The scientific study of mood has a respectable history. Aristotle, as might be expected, supplied us with the earliest in the Rhetoric, which was, in part, a common sense manual of instructions for inducing mood through oratory and drama. The words used by Aristotle have been variously translated as "mood," "frame of mind," and "disposition." His practical theory is that, having induced a particular mood in the audience or jury, the orator or dramatist will then not only find it easier to elicit certain emotional and other responses in his listeners but can also count on the fact that certain other responses will be less likely than usual to occur (see Nowlis, 1970).

In psychology, the literature is now rich with investigations concerning mood and general affective states. The considerable expanding of interest in mood studies ranges from mood conceptualisation and measurement, to analyses of mood antecedents, and to consequences and manifestations of mood (see Thayer, 1989). Recent research concerning the antecedents of mood has involved drugs and pharmacological agents, biological rhythms such as the menstrual cycle, and cognitive determinants which have been used in a variety of experimental mood induction methods. Studies concerning the consequences of mood have dealt primarily with cognitive functions (e.g. memory) and social behaviours (e.g. helping or social judgement). The large number of rather diverse scientific studies have suggested that mood has a variety of antecedents and effects on a wide range of behaviours. Nevertheless, the issues of mood measurement and conceptualisation are the most important because they are fundamental to any appraisal of the evidence on the antecedents and consequences of mood.

This chapter, then, begins with a general discussion of important definitions and distinctions necessary for an understanding of the mood phenomenon. Mood is conceptualised as a distinctive affective phenomenon, different from related constructs such as preferences, motives, and emotions. The primary focus in this chapter is upon some of the variables, and theoretical tracks that have historically been taken, in studies concerning self-reported and behavioural measures of mood. In addition, the importance of studying mood assessment is exemplified in the field related to mood changes across the menstrual cycle.

2.2 Differentiation of Mood and Emotion

The word *mood* is often used interchangeably with other common usage of related constructs such as feeling, affect, and emotion in both technical and popular languages. To conceptualise mood, perhaps the best way is to describe the similarities and differences between mood and the other affective constructs, particularly emotion.

Mood and emotion are both affective states as opposed to thinking, and both have good-bad or positive-negative valence. Both influence cognitive processes and predispose to some types of behaviour over others. They can also serve as communication with others. Perhaps because of these similarities, several emotion theorists (Bower, 1981; Mandler, 1990; Watson & Tellegen, 1985) used these terms interchangeably. However, Morris (1989) noted that there is a group of mood theorists, including the behaviourist Vincent Nowlis (1965), the neuropsychologist Karl Pribram (1970), the psychoanalyst Edith Jacobsen (1957), and the cognitivist Alice Isen (1984), who have attempted to preserve a distinctive meaning for the term *mood.*

The first distinction between mood and emotion rests upon quantitative differences among the various parameters of both states, such as duration and intensity. As compared with emotion, mood is typically thought to be less intense and

lasts a longer course of time (Nowlis, 1965). Another difference between the two is that of their antecedents and consequences. While the antecedents of emotion can often be identified, mood is often associated with no specific targets. Regarding their consequences, emotion is thought to instigate a relatively limited set of responses in comparison with mood. Mood seems capable of altering affective, cognitive, and behavioural responses towards a wide array of objects and events. Isen (1984) traced the relations between the minor mood-inducing events as antecedents and the broad influence of mood on thought, perception, behaviour, and memory. She concluded that obscurity of antecedents and pervasive influences on a variety of behaviours are the most defining characteristics of mood, especially when one attempts to distinguish between mood and emotion.

In spite of the apparent tendency of mood to associate with obscurity of origins, there is now increasing evidence to suggest that two broad categories of antecedents, i.e. cognitive and physiological factors, instigate mood or mood change. Cognitive analysis of antecedents for mood appears to be best understood from experimental studies in which mood is manipulated (see Martin, 1990 for a review). These various experimental methods demonstrate that mood can arise as the result of perceiving, recalling, or imagining hedonically-toned environmental events. On the other hand, mood is attributable to circumstances that are substantially endogenous and non-psychological in nature, and in particular, neurochemical substrates (see Thayer, 1989 for a review). An important source of evidence relating mood and physiological factors comes from empirical studies concerning the relationship between mood fluctuation and biological rhythm (Thayer, 1989). Therefore, it is probably that the interaction of cognitive appraisal and naturally occurring processes accounts for the major proportion of mood variance. The reason that people are often unable to identify the determinants of their own mood may indicate failing in awareness of the relevant dynamics of these likely antecedents.

With respect to the pervasive functions of mood on other behaviours, there are theoretical concerns in terms of specific roles or functions played by mood and emotion. The functional analysis of mood and emotion attempts to answer questions like, "Why are there moods? Why do we have various feeling states, and what do they enable us to do?" Morris (1992) postulated an inside-outside focus (i.e. self versus world) metaphor to differentiate the function of mood from that of emotion. In his view, mood signals the state of the *self* regarding resources available to meet perceived environmental demands, contrasted with emotion which is considered to indicate signals concerning the state of the *world.* Morris also cited several mood theorists who explicitly concur that mood informs us about our general state of being. For example, moods were described as "monitors" that reflect our appraisal of our life circumstances (Pribram, 1970), as "barometers of the ego" (Jacobsen, 1957), or as "a source of information or discriminative stimuli to the organism" (Nowlis & Nowlis, 1956). Similarly, Thayer (1989) conceptualised mood as "signal systems of resources or depletions, and of danger or safety. They register in conscious awareness the state of the whole body at any point in time and provide a continuing indication of readiness for action or of the need for rest and recuperation" (p.64). A different but congruent metaphor came from Batson et al. (1992) who employed expectation-of-*future*-pleasure versus expectation-of-*present*-pleasure distinction between mood and emotion. Emotion reflects the existence of a specific goal or of perceived change in one's relation to a specific goal in the *present*, while mood reflects a change in expectation about the general likelihood of positive or negative affect in the *future.*

In summary, mood is conceptualised as reflecting a specific type of affective states with valence and intensity that differs from related constructs such as preference, motive, and emotion. Compared with emotion, mood is typically less intense, lasts a longer course of time, and is often associated with unknown origin. The functional analyses of mood suggest that mood exists for the sake of signalling

states of the self in terms of physical, psychological, and social resources available to meet perceived environmental demands and future outlook about life, i.e. to facilitate self-regulation. In this capacity, mood is capable of influencing a broad array of potential responses.

2.3 Processes of Mood Experience and Reporting

As a distinctive affective state, mood is by definition a private and a subjective experience. The processes by which people register and respond to internal states have been discussed by Pennebaker (1982), on the basis of an information processing paradigm. Pennebaker attempted to dissect the processes of reporting internal states into stages of encoding, awareness, and reporting.

At the basic level, people are constantly processing sensation information without the necessity for conscious awareness, although it may be potentially available to consciousness. The awareness and subsequent reporting of internal states require a higher order of cortical processing. The awareness of internal states is a function of the relative magnitudes of internal receptor stimulation, the amounts of available external information, and the beliefs that people hold which cause them to selectively attend to the internal states. The jump from awareness to reporting involves with a new set of variables. A person who is aware of a given internal state may either not report it or over-report it, depending on potential reinforcement or punishment from others, or because of being motivated by self-image concerns. Although Pennebaker's dissections have been more concerned with symptom reporting, his approach nonetheless offers insights into how we perceive mood and how mood can be measured.

2.3.1 Encoding: Unconscious Mood

The notion that internal information can be processed without the necessity for conscious awareness implies that mood may move into or out of focal attention from time to time. Although some mood theorists insist that conscious registration is an essential feature of mood (e.g. Thayer, 1989), there has been a recognition that mood can be registered without it needing to be consciously attended to (Morris, 1989; 1992). According to Morris, several mood theorists have noted that mood has two different manifestations, i.e. "conscious" and "unconscious." Borrowing the figure-ground distinction from perception psychology, Morris suggested that the way in which mood affects us depends on the degree to which it is in or out of our focal attention. When being out of focal attention, mood has the characteristics of *ground* which subtly insinuate themselves into our lives. In this capacity, mood acts quite literally as the "frame of mind." Upon entering focal attention, on the other hand, mood rapidly acquires the characteristics of *figure* which has a pervasive influence on other behaviours.

2.3.2 Awareness and Reporting: Conscious Mood

As noted above, the awareness of internal states is dependent on a variety of psychological resources. People seem to make extensive use of their internal and environmental information in defining for themselves what their own mood experiences are. The influence of internal and external information for the experiences of affective states has been recognised by the so-called "arousal-plus-cognition theories" of emotion (Mandler, 1984; Schachter & Singer, 1962). The central idea of these theories is that when individuals are physiologically aroused and have no explanation for their arousal, they are likely to label this state or describe their feeling in terms of the knowledge available to them. Once an appropriate label is found, the person will no longer be driven to search for an additional label. In a now-classic

experiment (Schachter & Singer, 1962), individuals were aroused through concealed administration of adrenaline, and plausible causes were scattered about the laboratory environment to see if the individual who was both aroused and supplied with a plausible emotional cause would experience the specific emotion suggested by that cause. The results were broadly in agreement with Schachter and Singer's predictions.

Despite much controversy (see Reisenzein, 1983 for a review), Schachter and Singer's theory had considerable impact on social psychological thinking about emotion. One of the most important influences of Schachter and Singer's work is the suggestion that attributions for arousal are malleable. Subjects can be induced to attribute arousal from one stimulus to another. Over the years, the principles of cognitive labelling have been incorporated into a broad framework called causal attribution theory (see Hewstone, 1989). Rather than invoking a motivational state to explain why individuals label their internal arousal, causal attribution theories simply state that all organisms seek causal explanations for their own and other's behaviour. In fact, the substantive differences between the two approaches are trivial. Both make the same predictions about the use of internal and external information, and the subsequent behaviour.

These theories have important implications for self-reports of mood as well. According to these theories, the awareness and subsequent reporting of mood depend not only upon the perception of physiological arousal, but also on an appraisal of environmental events. It is possible that mood awareness and the subsequent reporting may arise from a "constructive" process in which an individual introspectively detects some internal feelings and then labels them in terms of what seems their most likely antecedent. In this case, the use of self-descriptive mood labels is a measure of mood which detects the constructive products resulting from inference, guessing, and the weighing of several sources of information.

2.4 Measurement of Mood

In the literature, there are two methods which have been employed to indicate mood occurrence: self-reported and behavioural measures. In the following sections, the empirical studies concerning self-reported and behavioural measures of mood will be reviewed, together with a discussion of the potential limitations of both assessment methods.

2.4.1 Self-Report of Mood

Self-reports of mood have been widely used in both laboratory and field studies, on the assumption that they are tapping the awareness and reporting domain. There are two important issues concerning mood assessment using self-rating scales: the dimensions of mood and the limitations of self report measurement.

2.4.1.1 Dimensions of Mood

Most modern analyses of mood owe a great deal to Nowlis (1965), who was the first to define and analyse mood using factor analysis through which mood dimensionality was obtained. The Nowlis Mood Adjective Check List (MACL) includes the dimensions of aggression, anxiety, surgency, elation, concentration, fatigue, social affection, sadness, scepticism, egotism, vigour or general activation, and nonchalance or general deactivation. After Nowlis, a large number of mood scales have been developed. Among them are the Profile of Mood States (POMS; McNair et al., 1971), the Multiple Affect Adjective Check List (MAACL; Zuckerman & Lubin, 1965), the Eight State Questionnaire (8SQ; Curran & Cattell, 1976). Another way of assessing mood is the use of visual analogue scales (Aitken & Zealley, 1970; McCormack et al., 1988), wherein participants merely indicate where they perceive themselves to be on a linear scale.

It is clear from these published studies that they all portray mood as multidimensional, without describing it as hedonically positive or negative. However, most investigators who employed these adjective scales only drew conclusions based on change among the hedonically positive and negative factors. In addition, affective ratings are often found to be circular, referred to as a circumplex structure (see Larsen & Diener, 1992). A circumplex is a two dimensional, circular structure in which those attributes correlate highly with those near the attributes in the circle, correlate near zero with those in one-quarter ways, and correlate inversely with the attributes in the opposite direction (see Figure 2.1).

Thus, it is not surprising that some current theoretical models of mood measurement have focused mainly on the two categories of positive and negative mood (Thayer, 1989; Watson & Tellegen, 1985; Zevon & Tellegen, 1982). One influential view is that there are two fundamental dimensions underlying the more numerous and circumscribed discrete affective factors. Watson & Tellegen (1985) re-analysed a number of studies conducted with diverse mood adjective checklists and extracted two major factors they considered meaningful in these studies. They concluded that self-ratings of mood can be interpreted by the circumplex model that relies on two orthogonal or independent dimensions named "Positive Affect" (PA) and "Negative Affect" (NA). Contrary to what the terminology implies, PA is a dimension of pleasurable engagement and reflects the extent to which someone feels enthusiastic, active, and alert, as opposed to sad and depressive. NA is a measure of unpleasant engagement, with those high in NA characterised by states such as anger, fear, disgust, whereas those low in NA are calm and serene.

The necessity of basic dimensions and the labelling of them remain controversial (Larsen & Diener, 1992). In a discussion of the circumplex dimensions, Thayer (1989) pointed out that the labels of PA and NA did not reflect the large activation components of these dimensions. Although the labels PA and NA refer to valenced

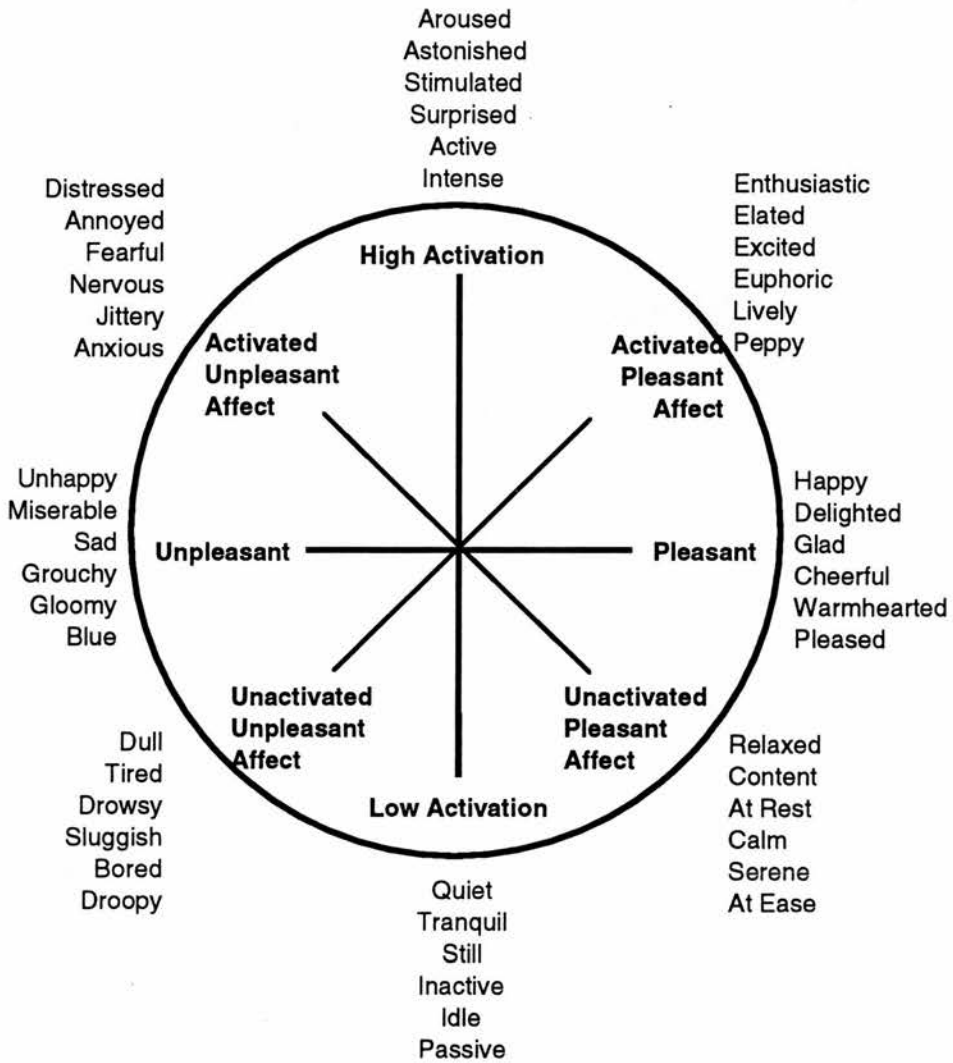


Figure 2.1 The Self-Report Affect Circumplex. Adapted from Larsen, R.J. & Diener, E. (1992). Promises and problems with the circumplex model of emotion. In M.S. Clark (Ed.), *Emotion* (pp. 25-59). Sage.

states, the adjective sets used to represent PA and NA reflect much more than hedonic valence. Instead of PA, Thayer (1989) preferred the label "energetic arousal," and, instead of NA, he preferred the label "tense arousal." Thayer's labels, nevertheless, explicitly acknowledge the activation content of what Watson and Tellegen (1985) called PA and NA.

Furthermore, it remains uncertain about exactly what the relationship between these dimensions is in a variety of situations. The independent relationship between

PA and NA (Watson & Tellegen, 1985) is a descriptive relationship indicating the way these dimensions of affect relate to each other in broad cross-sectional studies, and it does not necessarily indicate that the dimensions would maintain this independence when levels of affect are changed. There is evidence to suggest that the relation between NA and PA depends upon the rated time frames. Diener & Emmons (1984) suggested that NA and PA were moderately and negatively correlated when subjects rated how they felt during a relatively brief time period (e.g. right now or today), and the relation became independent only as the rated time frame lengthened (e.g. during the year). However, Watson (1988) reported that the correlation between PA and NA remained independent and did not systematically vary across the different rated time frames.

In sum, these studies reviewed above provide evidence concerning mood dimensionality. Unfortunately, the findings from factor analysis are not definitive and the concerns for the identification of basic dimensions and labelling them remain controversial. With factor analysis, the number of dimensions depends upon the number and composition of mood-descriptive adjectives used, and the statistical methods for extracting the number of factors. The relation between these factors is likely to be influenced by external factors such as rated time frames (Diener & Emmons, 1984) or response format (Watson, 1988). In addition, it is worth noting that not everyone agrees that mood assessment based upon self-ratings is valid (Nisbett & Wilson, 1977; T. D. Wilson et al., 1982).

2.4.1.2 Limitations of Self Report

As with any self-report measurement, the study of mood reporting is akin to problems associated with the Heisenberg uncertainty principle concerning the "observer effect" in physics. That is, measuring the phenomenon may be radically altering the phenomenon itself. Merely asking subjects which mood they are aware of

may prompt them to attend to their affective states in ways they may not normally have done (Knowles, 1988). In addition, poor correlations between people's reported attitudes and their subsequent behaviours have been well recognised in the field of social psychology. These notions cast doubts on the accuracy of self-report as a means of assessment because it is susceptible to distortion such as social desirability and other response bias (Rosenthal & Rosnow, 1991).

Perhaps one of the most fundamental problems regarding self-report measurement is the view that people do not have direct access to their cognitive process nor to the factors that are shaping their behaviour. In a highly controversial paper, Nisbett and Wilson (1977) maintained that people have little or no access to their cognitive processes. They reported a substantial amount of evidence from psychological studies indicating that many experimental participants are frequently unaware of the influences affecting their behaviour, and concluded that to ask people about their cognitive processes might be highly misleading. Nisbett and Wilson argued that when people state the factors that have influenced their behaviour, they merely report their theories about what caused what; theories that any observers might share. Similar limitations apply to our knowledge concerning our own feelings and internal states (T. D. Wilson et al., 1982). When subjects are reporting what has influenced their mood, they may be actually reporting their beliefs about what influence their mood, rather than the actual determinants.

Nisbett and Wilson's analysis touched off a heated series of responses. Their argument has been criticised as being overstated and hard to falsify (e.g. Fiske & Taylor, 1991; Quattrone, 1985; White, 1980). Nevertheless, their article has prompted discussions of what conditions are likely to promote accurate self-reports. For example, Ericsson & Simon (1980) proposed that accuracy of self-reports depends upon a number of temporal factors, such as whether the information reported is presented in short-term memory or whether the report concerns a concurrent or past

experience. The more one has to base one's reports on memories of past experience, the less accurate such reports will be. Another condition related to accuracy of self-reported internal states has been alluded to in Chapter 1, on the basis of self-awareness theories. When attention is directed internally by experimental manipulations such as a mirror, self-reported affective states are found to be more congruent with observable behaviours (Carver & Scheier, 1978; Scheier & Carver, 1977; see Gibbons, 1990; Matthews et al., 1982 for reviews).

However, the problem concerning self-report measurement of mood is not one of accuracy (Morris, 1989). To say that a self-report of some internal states is inaccurate suggests that there is some objective standard against which the report might be assessed. In the case of mood, there is no substantial evidence for the existence of such an objective standard accomplished to verify the results of self-reporting mood. In addition, according to the arousal-plus-cognition theories, it is the nature of mood experiences which gives rise to the use of self-descriptive mood labels. Indeed, Thayer (1989) suggested that for mood measurement, self-report may be a better index than any single physiological measure because conscious awareness of mood is not determined by a single general bodily arousal or sensation.

Thus, a distinction must be made between the validity of self-reports made by people concerning the reasons for their mood, versus the validity of people's ratings of their mood states. In the former case, people may be inaccurate in attributing their mood experiences because the schema applied to explain the feeling state might be an incorrect one. However, it is wrong to say that people do not have such mood experiences as shown by their self-ratings unless there are reasons to suspect their sincerity in self-reports.

2.4.2 Behavioural Measurement of Mood

The approaches that have been taken as a way of validating self-report measurement of mood are to employ a variety of mood induction procedures and determine the extent to which they similarly affect a given behaviour which itself, is measured in different ways. Changes in mood are often associated with alternations in psychomotor functions, and behavioural responses to environmental and social situations.

2.4.2.1 Psychomotor Activation

Clinical depression is often associated with psychomotor retardation and it has therefore been natural for investigators to assess the validity of self-reported mood by examining this behavioural variable. Researchers have employed either a correlational design (e.g. Mayer & Bremer, 1985) or a consensus accepted manipulation of mood followed by a battery of behavioural measures (e.g. Velten, 1968).

The most commonly used measurement of psychomotor activities has been writing speed, i.e. writing numbers in ascending or descending order from 100 over a one digit. Depressive mood, when induced by the Velten Mood Induction Procedure (VMIP; Velten, 1968; see also Chapter 5), has been found consistently to be associated with writing speed retardation in comparison with positive or neutral mood (Alloy et al, 1981; Hale & Strickland, 1976; Natale & Hantas, 1982; Velten, 1968). Natale (1977) found that writing speed difference was significant for the elation versus neutral comparison but not for the depression-neutral comparison. The results from studies employing the Music Mood Induction Procedure (MMIP; Sutherland et al., 1982; see Chapter 5) to elicit mood change, were less consistent. Compared to positive or neutral mood, the results of depressive mood associating with writing speed retardation have ranged from showing no difference (Lenton & Martin, 1991;

Parrott, 1991) to significant difference (Kenealy, 1988; Pignatiello et al., 1986 Experiment 2).

Several investigators have used speech variables to assess psychomotor functioning of induced mood. A commonly used technique is speed of counting-aloud, wherein subjects count from 1 to 10 aloud in their own pace, this has been found to be sensitive to mood induced either by the VMIP or MMIP (Clark & Teasdale, 1985; Richardson & Taylor, 1982; Slyker & McNally, 1991; Teasdale & Russell, 1983; Teasdale et al., 1980). Velten (1968) also found less spontaneous verbalisation to be associated with induced depression in comparison with induced elation mood. Natale (1977), on the other hand, found that speed of speech onset and articulation rates were significantly different for the elation versus neutral comparison, but not for the depression-elation or depression-neutral comparison.

Other psychomotor effects found to be associated with depressive mood induced by the VMIP, include poorer performance in the Digit Symbol Substitution Test (Hale & Strickland, 1976; Stiles & Gotestam, 1989), longer decision time (Lewis & Harder, 1988; Velten, 1968), and longer word association latencies (Velten, 1968). Rather than manipulating mood, Mayer & Bremer (1985) simply measured subjects' mood upon arrival at the laboratory on a one-time basis. They obtained a positive relationship between mood scores on a "pleasant arousal versus unpleasant tiredness" dimension and a composite measure of speed in tasks such as letter cancellation, letter search, and writing numbers forward. Their findings replicated the typical results found with the mood induction procedures.

Despite some inconsistencies, psychomotor activation such as measured in the number writing or counting-aloud tasks generally reveal a decrease in speed when subjects are induced towards a depressed mood and an increase in speed when they are induced towards an elated mood. Therefore, a battery of psychomotor tasks to tap

psychomotor speed or activation seems a suitable choice as behavioural indices of mood occurrence.

2.4.2.2 Cognitive Functions and Social Behaviours

Several cognitive functions and social behaviours have often been found to be associated with self-report measurement of mood occurrence. In the literature, the three most heavily researched mood-dependent behaviours are helping, memory retrieval, and perceptual judgement. However, the results show a similar pattern in that positive and negative mood, which seem opposite in their valence, do not produce "opposite" results on helping and memory measures (see Isen, 1984; 1990). In the case of memory, induced elation mood seems to facilitate recall of positive memories, while negative mood does not always have the same effect of causing recall of negative memories (see Blaney, 1986 for a review). Similarly, this asymmetric pattern has been noted in review articles concerning helping behaviours (Dovidio, 1984) and perceptual judgements (Forgas & Bower, 1987). Although this asymmetry is theoretically interesting, for the present purpose, it suggests that it is premature to employ these behaviours as validators for the presence of negative mood.

2.4.3 Summary

Self-reported and behavioural measurement of mood appear to tap the two manifestations of mood when it occurs in or out of focal attention. Self-report measurement of mood is feasible to detect mood occurrence available to focal attention, and provides information about the consciously available products. Self-reported mood is in error in a different sense from that which implies comparison to an objective standard. Individuals may under-report, misperceive, or over-report their mood experiences due to the quality and quantity of internal and external information available to a person. Given the various determinants of self-report, it will be more

fruitful to consider how internal and external information is converged to give rise to the labels of mood states

On the other hand, behavioural measures are more informative and permit the accumulation of detailed knowledge about the pre-conscious manifestation of mood. The validity of people's ratings of their current mood states has been studied by the employment of behavioural measures such as psychomotor activation, cognitive functions, and social behaviours. Although several cognitive functions and social behaviours have often been found to be associated with mood occurrence, the asymmetrical effect of positive and negative mood on these behaviours may discourage the use of these behaviours as validators for self-reports of negative moods. It appears that if "behavioural" indices are used to established the presence of mood in its manifestation as a ground, measurement of psychomotor speed or activation is a suitable choice.

2.5 Assessment of Mood Change across the Menstrual Cycle

In the sections that follow, systematic mood changes in women during the course of menstrual cycles will be reviewed. The review is conducted because of having access to recruit female subjects for the experimental purpose. In addition, self-reported mood fluctuation from a majority of women is often found to covary with known endogenous changes. The review of empirical studies in this area also provides a better understanding about the complicated dynamics of exogenous and endogenous events as the mood antecedents. Furthermore, it gives an example of the ways in which mood measurement issues are complicated and often confounded. The primary focus of this review is upon mood fluctuation across the menstrual cycle in a normal female population, together with a discussion of the methodological problems particularly related to mood measurement.

Most women report changes in their physical and mood states concurrent with their menstrual cycles. Figure 2.2 presents relative levels of hormones throughout the menstrual cycle. Oestrogen and progesterone are two gonadal hormones that increase and decrease systematically in the course of the menstrual cycle. Oestrogen is low during menstruation, peaks at ovulation, and then drops to rise again before falling to low levels in the week before menstruation. Progesterone is low until oestrogen reaches its second peak, and then reaches a higher level than oestrogen before dropping off in the week before menstruation (Carlson, 1994).

Self-reports of mood and physical changes from women are coincident with these underlying biochemical changes. Negative mood and uncomfortable physical complaints predominate in the Luteal phase prior to menstruation and then subside following the onset of menstruation. The middle of the cycle, e.g. the follicular and ovulatory phase, is most often characterised by positive moods. The common

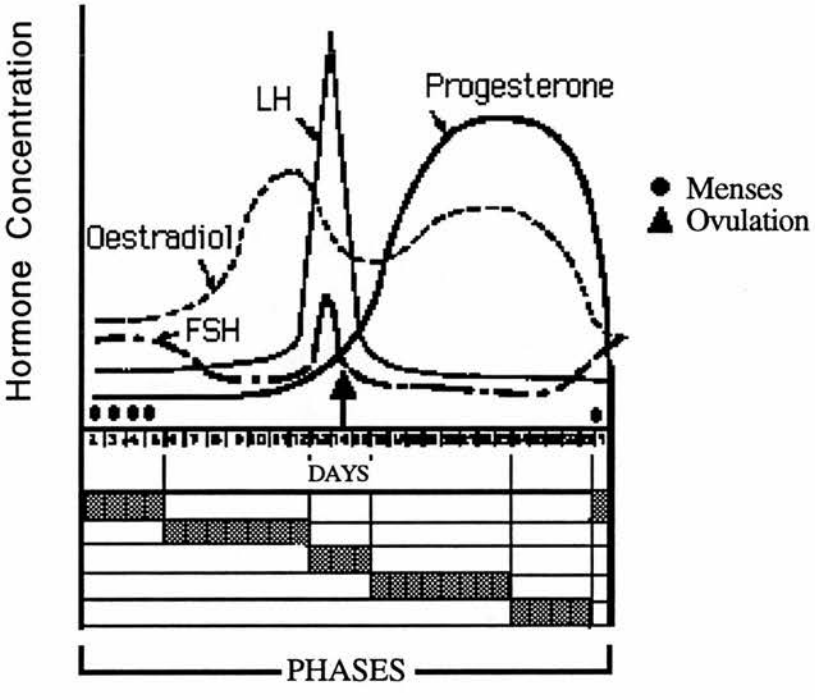


Figure 2.2 Relative levels of oestradiol, progestrone, FSH, and LH throughout the menstrual cycl. Adpated from Shaw (1978). Neuroendocrinology of the menstrual cycle in human. *Clinics in Endocrinology and Metabolism, 7*, 531-559

premenstrual changes include depression, irritability, tension, lack of energy, abdominal bloatedness, breast tenderness, headache, urinary frequency, craving for special foods, insomnia, and reduction or increase in sexual interest (Bancroft & Backstrom 1985).

In an epidemiological study, Andersch (1980, cited in Sanders et al., 1983) showed that of 1083 Swedish women, 2%-3% reported severe or distressing premenstrual symptoms; 10% would have welcomed treatment for such symptoms; 70% reported mild or moderate emotional and physical changes before menstruation; and 92% reported at least one premenstrual change. A World Health Organisation cross-cultural survey (1981) has found that a large number of women throughout the world reported physical discomfort and mood changes associated with menstruation. Among 550 women in the UK, 57% reported physical discomfort and 71% experienced mood changes prior to or during menstruation. In a small proportion of the female population, cyclically occurring negative changes are serious enough to interfere with their daily activities, and these have become known as sufferers of the premenstrual syndromes (PMS) or premenstrual tension (PMT).

Although the premenstrual changes covary with biological caused events of the menstrual cycle, several review articles have concluded that the understanding of the biological or hormonal aetiology of PMS has been hampered because of a number of methodological shortcomings, making both cross-study comparisons and negative results difficult to interpret (Bancroft & Backstrom, 1985; Rubinow & Roy-Byrne, 1984; Walker, 1992). These methodological shortcomings include asymmetrical emphasis on negative changes during the premenstrual phase, a lack of agreement about the selection criteria for subjects to be studied, and problems associated with self-reports of mood change.

2.5.1 Asymmetrical Emphasis

In the literature, there has been an emphasis not only on the premenstrual phase instead of the whole cycle, but also on negative rather than positive experiences. When changes across the whole cycle are studied, some studies have found continuing negative feelings reaching their peaks during menstruation rather than during the premenstrual phase (Bancroft et al., 1988; Chen & Filsinger, 1987; Warner et al., 1991), possibly depending upon relatively severe physical symptoms during menstruation (Chen & Filsinger, 1987), factors pertinent to individual's previous history of mood illness (Warner et al., 1991), or culture-related menstrual practices (Asso, 1983).

The use of questionnaires which only focus on negative symptoms may provide at least two ways in which the understanding of normal cyclical change is biased. First, it is not surprising that women only report negative feelings, such as depression or anxiety, if those are the only feelings which have been investigated (Ussher, 1989). Recent research has shown that women do report experiences of positive changes at every stage of the menstrual cycle if they are allowed to express views about positive aspects of their experience (Logue & Moos, 1988; Warner & Bancroft, 1988). Logue & Moos (1988), for example, suggested that about 5%-15% of women experienced increased excitement, energy, and well-being in the perimenstrual phase.

Secondly, such negativity-focused questionnaires may be taken as situational cues to direct a woman's attention towards negative parts of her cycle-related experiences, which in turn will bias processing of information about cyclicity (Brooks et al., 1977). There is evidence that only when the menstrual cycle is explicitly made salient that broad cyclical variations are obtained (Englander-Golden et al., 1978). It has also been suggested that labelling questionnaires as "Menstrual Distress Questionnaire" (MDQ) will produce cyclical effects, while non-specific mood questionnaires show no such cyclical variation (Golub & Harrington, 1981). But

other studies found that the labelling or non-labelling of questionnaires as relating to menstruation has little effect (Chernovetz et al., 1979; Markum, 1976).

2.5.2 Selection Criteria

Another serious problem with varying methodology has been a lack of agreement about the selection criteria for subjects to be studied. As there are no agreed criteria for the diagnosis of PMS, self-diagnosis is often used as a means by which to define women as "sufferers" or "non-sufferers." Ussher (1989) reported results from her PhD research such that no difference could be found, on psychological or behavioural measures, between a group of women who suffered from severe PMS and a group who claimed to be without symptoms. However, her later study (Ussher & Wilding, 1992) found that self reported arousal and stress increased premenstrually for all subjects, with a suggestion that a greater premenstrual change was reported by the PMS group. Several studies also suggested that most women experience cyclical mood change but more severe mood fluctuation is obtained in women with PMS than those without PMS (Hart & Russell, 1986; Metcalf et al., 1989; Sanders et al., 1983). Other studies have reported an absence of cyclical mood changes in women who considered themselves without PMS (Casper & Powell, 1986; Lahmeyer et al., 1982; Rubinow et al., 1986). To further muddy the waters, Morse et al. (1988) reported an inverse pattern of cyclical mood change for their non-PMS subjects, i.e. more negative mood was obtained during the follicular phase than the luteal phase.

These studies suggest that there are considerable variations in the patterns of changes reported across different individuals. Despite some inconsistent results, women who do not suffer from PMS in general report either less severe or an absence of cyclical mood changes in comparison with those self-diagnosed as PMS sufferers. However, this conclusion needs to be tentative because the use of self-reports as a means of assessing mood change. The measurement issues have raised the

consideration as to whether self-reports of mood change largely reflect either socially induced attitudes about menstruation, or the actual experience of cyclical changes.

2.5.3 Mood Measurement across the Menstrual Cycle

It is generally found that women report marked cyclicity in mood, with negative moods being experienced premenstrually when asked to account retrospectively, but that this pattern was less significant or rarely observed in daily ratings (see Rubinow & Roy-Byrne, 1984 for a review). The marked differences between the two assessment strategies may imply that women merely report their social beliefs or stereotypes rather than actual events occurring across their menstrual cycles (Aubuchon & Calhaun, 1985; Brooks et al., 1977; Ruble, 1977). In a widely cited study (Ruble, 1977), women's beliefs about which stage of the cycle they were in were manipulated. A group of female college students were variously informed, who were all in fact within six to seven days prior to the onset of their menstruation, that they were either in the premenstrual phase and about to enter menstruation or were in the intermenstrual phase. The "as if premenstrual" subjects reported a higher degree of symptoms than those "as if intermenstrual" students. Ruble interpreted this as evidence of the influence of psychosocial factors on self-reported menstrual distress. Similarly, another study using the "as if" method (Brooks et al., 1977) found that the "as if premenstrual" group expected more severe symptoms than the "as if intermenstrual" group.

There is now a consensus of opinion which suggests the view that prospective ratings should be employed instead of retrospective ratings in order to control for stereotypically biased responses (Bancroft & Backstrom, 1985; Livesey et al., 1989; Rubinow & Roy-Ryrne, 1984). However, cognitive factors can bias even prospective or current symptom or mood reporting (Aubuchon & Calhaun, 1985; Olasov & Jackson, 1987). Aubuchon and Calhaun (1985) examined the role of social

expectancy and experimenter demand characteristics on self reports of cyclical mood and physiological change. Of 18 female university students without PMS complaints, half were told that the purpose of the study was to examine changes in psychological and physiological variables over the course of the menstrual cycle. The remaining women and 9 male students were told that the study's purpose was to examine changes in these variables over time. All students were asked to record their moods and symptoms everyday for 8 weeks prospectively. Only women who were aware of the purpose reported premenstrual increases in negative mood and physical complaints; the "naive" subjects were very similar to the men in their self-reports and showed no evidence of premenstrual worsening. It was concluded that women's self-reports of menstrual change are influenced by the experimental demand characteristics even in the prospective study.

These studies are often interpreted by the investigators as support for the effect of social beliefs, and imply that the obtained outcomes from self-reports are inaccurate for the real experiences of the cycle. However, an alternative explanation is possible to account for these findings, according to the very nature of mood experiences which has been elaborated in the previous sections. If a woman often has pronounced changes in her cyclical course, she will develop an idea of and feeling about these physiological or psychological changes. The instructions employed in these studies are likely to draw the subject's attention to the "fact" that she is premenstrual, which in turn may make the overall experiences about her cyclical change more salient and accessible. A woman may introspectively detect some internal feelings and then label them in terms of what seem their most likely antecedents, in this case her overall experience of the cycle. The inferential and attributional processes may differ according to the various instructions given in these studies.

Indeed, it has been argued that the attribution of perceived changes during the menstrual cycle may have a marked effect on mood and behaviour. Koeske & Koeske

(1975) investigated the link between premenstrual emotionality and attribution patterns, and their results suggested that negative moods or physiological symptoms which occurred in the premenstrual phase were likely to be attributed to biological factors, whilst positive moods or physiological changes were more likely attributed to personality or situational factors. The different attribution patterns among cyclical phases have been replicated in other studies (Bains & Slade, 1988; Slade, 1984). In addition, negative events are more likely to instigate causal attribution than positive events (Schwarz & Clore, 1983). Whereas negative events occur when people are already feeling dysphoric, they may assess the cause more negatively than if they had been in a happy mood. Such negative causal attributions may then further exacerbate the severity of negative mood (Storms & McCaul, 1976). Taken together, the knowledge of being in the premenstrual phase, coupled with such asymmetric effects of positive and negative events on attributions may partly explain the common outcomes of negative mood being reported premenstrually. Thus, the results of these studies may reflect a woman's overall experiences of her menstrual cycle so that it would be incorrect to imply that the obtained self-reported data are inaccurate.

2.5.4 Summary

The present evidence suggests a fair picture that a majority of women experience the occurrence of some negative moods and somatic complaints prior to menstruation. Menstruation is often reportedly marked by relief from premenstrual negative mood, but some studies have found continuing negative feelings experienced after the onset of menstruation. The middle of the cycle is most characterised by positive mood. In general, such negative moods experienced during the premenstrual phase are more severe in a small proportion of women who are self-diagnosed as suffering from PMS than those without PMS.

Nevertheless, the conclusions drawn concerning cyclical variations in mood should be tentative because a great deal of information is lacking. The most notable is the lack of understanding concerning the complicated determinants of mood reporting. Self-reports of cyclical mood change are not determined simply by the known fluctuations in biochemical levels or changes. Other determinants include an individual's learned experiences and attitudes towards the menstrual cycle, as well as differential attribution patterns instigated by positive and negative events across the menstrual cycle. For the appraisal of the evidence derived from self-report measurement, it is essential to study how women interpret and reply to questions in any self-reported instrument under a particular context.

2.6 Conclusion

Mood is a specific type of affective state with intensity and positive-negative valence. As compared with emotion, mood is typically considered as more enduring and less intense and has more pervasive influences on a broad array of cognitive functions and other behaviours. Although mood is not usually identified with a particular stimulus, it has been suggested that mood is primarily created and maintained by the interaction of naturally biological processes and cognitive appraisal of external events.

Mood measurement issues are discussed at length in this chapter because of the need to provide a reliable and valid measure for all research findings in this field. Self-reported and behavioural measures of mood are frequently employed in empirical studies. Given the possibility mood can exist out of focal attention, behavioural checks of mood are needed not only to validate self-reports of mood determinants, but also to tap the manifestation of unconscious mood. The present evidence suggests that measurement of psychomotor speed and activation is a better choice as a surrogate measurement of mood.

The evidence reviewed suggests that self-reported mood can be successfully submitted to dimensional analysis that, in turn, allows systematic research for the interrelation amongst these mood dimensions. Nevertheless, mood reporting is a complicated process in which a variety of variables, both endogenous and exogenous, may converge to influence the outcome. The complicated determinants of mood experiences and mood reporting processes have been exemplified in the area concerning cyclical mood change. The variables to influence self-reporting processes range from perception of physiological and biochemical change, through cognitive appraisal of situational factors, to the involvement of cultural and social factors. It is thereby essential to elucidate the ways in which the internal and situational factors contribute to the determination of self-reporting processes.

CHAPTER 3
COMPUTERISED VERSUS CONVENTIONAL ASSESSMENT OF MOOD CHANGE ACROSS THE MENSTRUAL CYCLE

3.1 Introduction

One of the first things which clinical psychologists did with computers was to take questionnaires and transfer them into the computerised format. This approach continues and many standard personality and mood questionnaires are now computerised and widely used in clinical settings. The questions come up on the visual display unit and the respondent presses the computer mouse button or types in responses at the keyboard. Computers may also be pre-programmed to calculate or interpret the obtained scores.

With respect to computerised mood measurement, studies employing correlational designs have suggested that reliable affective ratings can be achieved with the CBT administration (Glaze & Cox, 1991; Gonzalez, 1993; Maruff et al., 1994; Swanston et al., 1993). Nevertheless, some studies have reported heightened negative mood in the CBT format when mean score comparison is used (Carr & Ghosh, 1983; George et al., 1992; Lewis et al., 1988). An identical result was obtained in two pilot studies run by the experimenter in a comparison of CBT and P&P mood assessment. All subjects in these studies were volunteer females. The measurement involved a 16-item instrument using Visual Analogue Scales (VAS; see section 3.2.3 for more details) concerned with subjective mood and physical states related to their menstrual variation. In the first study, half of 14 high-school students completed a CBT version and the other half a P&P version. Subjects reported higher intensity of feeling "irritable," "depressed," and "body swollen" via CBT than those tested with the P&P version. 59 subjects took part in a second study, 22 were assigned to complete CBT mood assessment and 37 were tested via the P&P format.

The result was similar to that of the first pilot study with specific feelings such as "irritability" and "tension" being heightened in CBT.

The mean differences between CBT and P&P mood assessment may be attributable to the HCI factors operating in the computer situation but not in its P&P counterpart. The heightened negative mood of CBT might be because that people are more willing, or less inhibited about confessing socially disapproved behaviours in the CBT modality precisely due to the impersonal characteristics of computerisation (Evan & Miller, 1969; Koson et al., 1970; Smith, 1963; see also discussions in Chapter 1). On the other hand, CBT administration has been said to be more anxiety-provoking, especially to those who are less familiar with computer use (George et al., 1992; Hedl et al., 1973; Lushene et al., 1974). Relative familiarity with the administration procedure may influence a participant's emotional reactions and psychological connotations for this particular administration modality. It is thereby possible that such between-modality nonequivalence is a function of a participant being relatively less familiar with the CBT administration.

As suggested in Chapter 2, self-reports of mood fluctuation across the menstrual cycle in women are not only determined by the underlying biological events, but also influenced by situational factors such as social desirability. Most women experience fluctuation of mood and somatic complaints across their menstrual cycles (Asso, 1983), with premenstrual changes in mood and somatic complaints being predominantly negative. Menstruation is often reportedly marked by relief from the premenstrual negative mood. The middle of the cycle is most often characterised by positive feelings. However, the reliability and validity of menstrual fluctuation have been questioned because the self-report data may be vulnerable to response sets such as distortion, confirming with expectancy or experimenter demanding characteristics (Rubinow & Roy-Byrne, 1984).

The purpose of the present study is to examine the effects of the CBT versus P&P administration upon the self-report measurement of mood change across the menstrual cycle. It is hypothesised that women will report greater disclosure of menstrual fluctuation via the CBT administration due to reduced pressures towards social desirability with a computer interaction.

3.2 Methods

3.2.1 Subjects

The study was carried out in a hairdressing salon from November 1991 to February 1992. All the subjects were volunteer customers who visited the salon regularly.

A demographic profile of the customers of the salon was constructed by the owner Gordon Wilson in 1991. Most of the customers (81%) came from the Edinburgh area and were largely middle class. The socio-economic distribution of the clients is described as: 42% of the customers are from the AB socio-economic group (professional and executive); 21% are from the C1 group (clerical and administrative); 5% are from the C2 group (skilled manual workers); and 31% are from the DE group (the majority are housewives and students rather than the unemployed). The age of the clients are evenly distributed, with 66% of the female customers between the ages of 26 and 55.

A total of 199 customers were approached and asked to participate. Only three of those approached refused to take part in this study. Of the 196 subjects, half received the CBT version of questionnaires while the other half were given the P&P version at the initial session. After completion of the tests, they were asked to help out with taking the alternative version of the same questionnaires at their next appointment. There were 84 subjects (42.8%) retested. The mean interval between

these two stages was 53.0 (S.D.=19.1) days . The age distribution of the whole sample is presented in Table 3.1. More than half of the subjects were aged between 26-45 years old.

3.2.2 Design of the Study

From a methodological point of view, it would have been desirable to have all subjects involved in the project prior to their hairdressing appointments with the adaptation of a test-retest design. Such a design allows the examination of the between-modality equivalence for assessment of mood fluctuation across the menstrual cycle. However, due to practical considerations, it was not always possible for certain subjects to be tested or retested under the desirable design. The analyses reported, therefore, include the data from subjects who could only be tested once as well as from those who had been retested.

Any selection biases which may affect the validity of the project were excluded by ensuring that the allocation of subjects to both testing conditions was randomised. The conditions for either the CBT or P&P versions of tests were alternated by 4-hour sessions. The order of testing conditions was further counterbalanced on the basis of days. For example, subjects recruited in the first part of the day were given the CBT version, and then switched to the P&P version in the afternoon. The order was counterbalanced on the next day.

Table 3.1. Age Distribution for Each Experimental Condition

	Age Range				
	15-25	26-35	36-45	46-55	Total
Initial Test					
CBT	18	29	37	14	98
P&P	27	29	36	6	98
Total	45	58	73	20	196
Retest					
CBT - P&P	4	14	23	4	45
P&P - CBT	7	8	22	2	39
Total	11	22	45	6	84

3.2.3 Measurements

Three questionnaires, i.e. visual analogue scales, a social desirability scale, and a general health questionnaire were employed in this study (examples of these questionnaires are presented in Appendix I). The characteristics of these questionnaires are described as follows:

(1) *Visual Analogue Scales (VAS).* The scales consisted of 16 items. Seven of them concerned with the transient mood states, i.e., (1) cheerful and happy; (2) energetic and active; (3) sociable and friendly; (4) depressed and unhappy; (5) fatigued and tired; (6) irritable; and (7) tense and anxious. The remainder focused on menstrually physical complaints, i.e., (1) breast tenderness; (2) body swollen; (3) period pain; (4) thirsty; (5) dry mouth; (6) hunger; (7) nausea; (8) craving for savoury foods; and (9) craving for sweets. Each item was presented with a 10-cm continuous line 0_____100 and subjects were asked to mark a cross on the line in the appropriate place to represent the degree of that mood or physical sensation experienced at that moment.

The advantage of the VAS has been said to be their simplicity and fast completion time while permitting fine discriminations in the quantification of mood, and their suitability for statistical analysis (see McCormack et. al., 1988 for a review). For the purpose of assessing cyclical variation of change, Sanders et al. (1983) concluded the VAS to be the most satisfactory as well as the most acceptable to their subjects in comparison with a variety of self-report instruments. Their results also suggested that the VAS are a valid and reliable format of measuring mood and somatic complaints across the menstrual cycle.

(2) *Social Desirability Scale (SDS).* Ten items, from Paulhus' (1984) two-component model of "socially desirable responding," were adopted to form this scale. The items covered the dimension of impression management which consisted of items concerned with socially desirable but statistically infrequent behaviours. Each item

was rated on a five-point scale. Subjects circled a point to indicate how closely the item describe them (1= uncharacteristic of me or untrue; 5= characteristic of me or true). The scores of half the items were reversed when linearly adding the 10 items as a summary score.

(3) *General Health Questionnaire (GHQ)* This questionnaire was designed to assess the personal data, menstrual information and general health status. One of the important purpose of this "general health" questionnaire was to disguise the importance of the menstrual cycle in the present study.

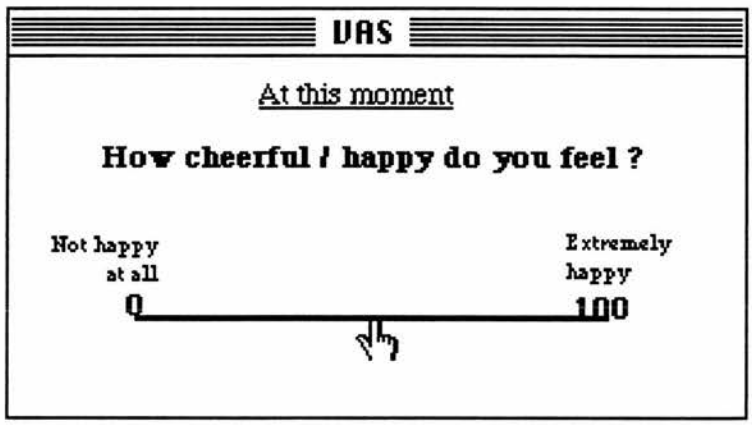
3.2.4 Computer System and Software Design

The VAS and SDS each has a complimentary computerised format. The computerised versions of both scales were constructed in HyperCard on the Apple Macintosh computer and programmed with the HyperTalk programming language by the experimenter. The equipment involved in the project included a minimum configuration of an Apple Macintosh SE microcomputer with two floppy disk drives, and a computer mouse was used as the responding device. The graphical user interface (GUI) of the Apple Macintosh computer requires the user to operate a computer mouse to directly select words or images on the screen to perform the functions. The GUI of the Apple Macintosh computer has been said to be more user-friendly, easier to use, and less prone to error (Colbourn, 1991).

The software design aims to ensure the administration procedure of the CBT version to be as close to its P&P counterpart as possible. This HyperCard-based program has been designed to perform several important operations for the present experiment. The experimenter first launched the program, entered the ID code assigned for the participant, and prepared the participant for interacting with the computer. The instructions were graphically displayed on the computer screen with text, buttons, and icons. The participant was asked to practise in operating the

computer mouse. After the trial session, the program presented the instructions for completing the scale. The interaction between the computer and the subject involved the presentation of an item and the subject responding with the computer mouse (see Figure 3.1). Prior to the presentation of the next item, the current response already entered can be reviewed and altered if desired. The interaction continued until each item was answered. After all the items were completed, the program made a closing remark. Afterwards, the program continued to administer the instructions for the next scale or made closing remarks for the whole session. The basic flow of the program is summarised in Table 3.2.

A VAS was presented on the screen. The subject responded by moving the cursor to point at the appropriate place of the line and then pressed the mouse button.



After the button was pressed, an "arrow" icon was presented to indicate the degree of that mood. Before clicking at the "NEXT" icon, the subject can change the answer by clicking at another place of the line.

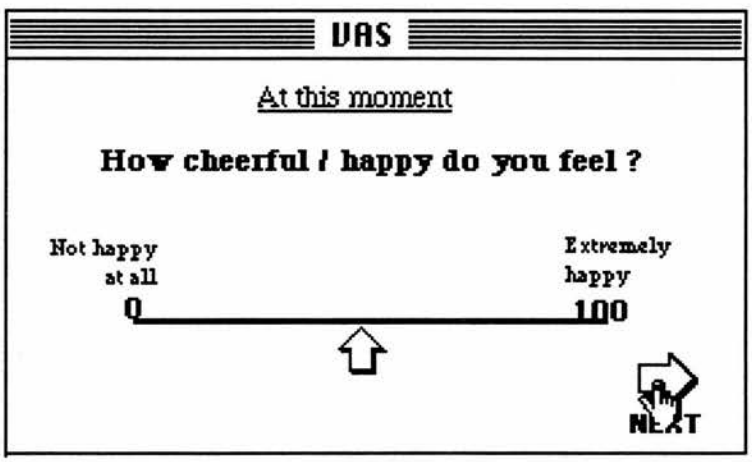


Figure 3.1 Examples of Subject-Computer interaction for the completion of the computerised VAS.

Table 3.2 Summary of the Basic Flow in the Computer-Based Testing

1. Experimenter sets up the computer
2. Computerised instruction to the subject
3. Subject practices to use the computer mouse
4. Computerised instructions for completing a particular test (e.g. VAS)
5. Subject-Computer interaction
   a) computerised presentation of each item
   b) subject responds by pressing the mouse button
6. Computerised closing remarks for this test
7. Repeat step 4-6 if followed by any test.
8. Computerised closing remarks for the whole session

3.2.5 Procedure

All experimental sessions took place during the working time of the salon. The customers were first asked by the salon's receptionist if they were willing to participate in a study being run by a research student of the Psychology Department of the University of Edinburgh. Once a customer agreed to take part in the study, she was allocated to either the CBT or P&P condition by the randomisation procedure described above. The experimenter then gave the following instructions to the participant:

> "The purpose of this study is to measure the relationship between mood states and general health. There are three questionnaires and they will take less than ten minutes to be completed.
>
> There will be instructions for each questionnaire, please read them carefully before you start to answer the questions. All the questions are not tests of intelligence or ability and there are no right or wrong answers. Please answer each question frankly with your first reaction to it.
>
> If you have any problems when you are answering the questions, please let me know. You are free to stop at any point if you do not wish to continue."

At the beginning, subjects read the instructions and practised the trial session while the experimenter was present. In the CBT condition, subjects could practice as long as they wished to ensure that they knew how to respond by using the computer mouse. After instructions and any clarification in the trial session, subjects proceeded to complete the VAS and SDS via either the CBT or P&P administration according to their assigned condition. Following the completion of these scales, the GHQ was administered to all subjects in the P&P format. At the end of the session subjects were asked if they would like to help further an alternative version of the tests at their next appointment.

3.2.6 Data Analysis

3.2.6.1 Principal-Component Analysis of the VAS

Most of the variables in the VAS were highly interrelated. In order to transform the original variables into new 'summary' scores, a principal-component analysis[1] was performed, using only scores obtained from subjects tested at the first session. Separate analyses were performed for the CBT and P&P version. The "Graphical Scree Test" proposed by Cattell (1966) was employed to determine the number of factors. In this method, a graph is drawn of the descending variance accounted for by the factors initially extracted. The plot typically shows a break between the steep slope of the initial factors and the gentle one of the later factors. The factors to be retained are those which lie before the point at which the eigen values seem to level off (see Bryman & Cramer, 1990). This occurred after the first three factors in both test

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[1] All the quantitative analyses presented in this thesis were accomplished by using the statistical packages "StatView SE+Graphics™" and "SYSTAT" for Macintosh.

conditions, accounting for 49.6% of the variance in the CBT version and 47.0% in the P&P version.

As shown in Table 3.3, both assessment modalities had similar patterns of factor loadings on the unrotated factors. The same analysis procedure then was applied to the whole sample and revealed a similar pattern of factor loadings on the unrotated factors. By applying orthogonal transformation to the unrotated factors, three factors were extracted (see Table 3.4). The first factor has all the variables concerned with subjective mood states in the appropriate direction, the second mainly consists of the variables regarding physical sensations, and the third contains the variables of physical complaints. Therefore, the first factor was labelled as "Distressed Mood", the second as "Physiological Sensation" and the third as "Physiological Distress" tentatively. The three summary scores are calculated for each subject by linear combination of the original variables.

3.2.6.2 Selection of Subjective Data

In order to calculate cyclical change of mood and physical complaints, the selection of data was carried out to exclude those who were pregnant, menopausal or did not give sufficient information for the stage of their cyclical phases to be adequately determined. Among them, 17 subjects (8.7%) were menopausal, 3 (1.5%) were pregnant, 36 (18.4%) did not give sufficient menstruation information for analysis. The selection offered 140 subjects (60 subjects were retested) with valid menstrual information for analysis.

As already mentioned, it was not always possible for certain subjects to be tested or retested prior to their hairdressing appointments. At the initial session, 72 of the 140 subjects received the tests prior to their appointments and 68 did the tests afterwards. The distribution of subjects for cyclical phase, testing formats, and when the tests was done is presented in Table 3.5.

Table 3.3 Principal-Component Analysis: Loadings of Variables of Mood Scale for the CBT and P&P Versions of the VAS.

	Factor 1		Factor 2		Factor 3	
	CBT	P&P	CBT	P&P	CBT	P&P
Eigen Value	4.57	3.74	1.95	2.32	1.43	1.46
% of Variance	28.5%	23.4%	12.2%	14.5%	8.9%	9.1%
Happiness	- .62	- .42	.28	.61	.08	- .02
Irritability	.68	.63	- .18	- .32	- .15	.15
Activation	- .53	- .32	.48	.53	.13	.20
Depress	.72	.62	- .20	- .31	.10	.35
Fatigue	.65	.53	- .21	- .16	- .01	.24
Tense	.74	.64	- .12	- .22	- .19	.30
Thirsty	.27	.37	.68	.44	- .34	.44
Br.Tender	.42	.45	.42	.37	.14	.03
Bd Swollen	.54	.65	.14	.21	.27	- .03
Period Pain	.38	.44	.15	.14	.69	- .60
Cr. Sweets	.47	.46	.25	.45	.49	- .15
Cr. Savoury	.48	.44	.35	.37	.07	- .30
Sociability	- .59	- .33	.38	.46	.31	.32
Hunger	.34	.20	.45	.49	- .39	- .14
Nauseous	.41	.54	- .05	.00	.26	- .49
Dry Mouth	.42	.42	.54	.47	- .30	.31

Table 3.4 Orthogonal Transformation for the Whole Sample.

	Factor 1 Distressed Mood	Factor 2 Physiological Sensation	Factor 3 Physiological Distress
Eigen Value	2.99	1.97	2.39
% of Variance	18.7%	12.3%	14.9%
Activation	- .71	.05	.07
Sociability	- .67	.01	.11
Happiness	- .67	.05	- .12
Tense	.59	.26	.25
Fatigue	.58	.14	.20
Irritability	.58	.09	.30
Depress	.58	.01	.42
Thirsty	- .04	.84	.04
Dry mouth	.09	.76	.16
Hungry	.07	.63	.13
Period Pain	.04	- .10	.69
Cr. Sweet	.06	.21	.60
Bd Swollen	.27	.08	.60
Cr. Savoury	.14	.23	.54
Br.Tender	- .06	.27	.48
Nauseous	.36	- .04	.46

Table 3.5 Number of Subjects for Each Cycle Phase by Testing Mode

Prior to Hair Appointments

Cyclical Phase[1] TEST MODE	M	Fol.	Ovu.	Lut.	PM	TOTAL
CBT	5	3	2	12	11	33
P&P	10	6	4	7	12	39
TOTAL:	15	9	6	19	23	72

After Hair Appointments

Cyclical Phase[1] TEST MODE	M	Fol.	Ovu.	Lut.	PM	TOTAL
CBT	8	2	6	16	9	32
P&P	10	10	4	9	7	36
TOTAL	18	12	10	25	16	68

[1] Cyclical Phase: M= Menstrual; Fol.= Follicular; Ovu.= Ovulation; Lut.= Luteal; PM= Premenstrual.

3.2.6.3 Division of the Cycle Phases

The common method for studying menstrual changes is to sub-divide the cycle into phases and add the mood and symptom scores for each phase (Asso, 1983). In the present study, each individual's menstrual cycle was divided into five phases on the basis of the menstrual information obtained in the GHQ. A conventional way of dividing up and naming the different phases of the normal 28-day cycle is as follows (see also Figure 2.2, p. 45):

Menstrual phase	Days 1 to 5
Follicular phase	Days 6 to 11
Ovulatory phase	Days 12 to 16
Luteal phase	Days 17 to 23
Premenstrual phase	Days 24 to 28

Previous researches have suggested that variations in the length of normal cycles occur mainly in the first half of the cycle before ovulation (Asso, 1983). That is, the differences are usually due to the length of the pre-ovulatory phase which in general tends to be more variable, and the phase after ovulation is virtually constant from young adulthood until menopause. Therefore, for those whose normal cycle length is

not 28 days, the length of follicular phase is varied to account for the variation of cycle length (Figure 3.2).

3.3 Results

3.3.1 Phase Distribution

A first surprising and unexpected result is the non-randomised distribution of subjects according to the cyclical phases. As there was only one variable (i.e. cyclical phase), the "goodness of fit Chi-Square" analysis (Coolican, 1990) was employed. The chi-square analysis, which took into account the variation of length among the cycle phases, revealed that most of the volunteers recruited were in the premenstrual, menstrual, and luteal phase, whereas the fewest was in the ovulatory phase (χ^2=10.3, d.f.= 4, p< .05). That is, subjects were more likely to visit the hairdressing salon

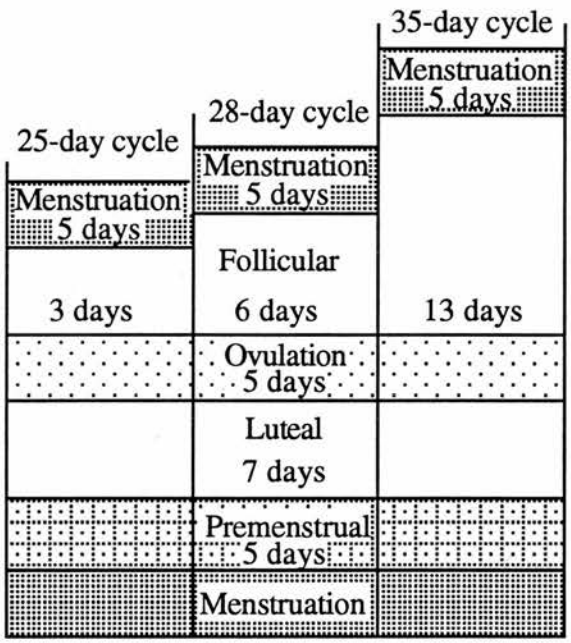

Figure 3.2 Typical distribution of days in three different lengths of the menstrual cycle. Variations normally occur before ovulation. Adopted from Asso (1983).

when they were in the premenstrual and menstrual phase than those in the intermenstrual phase. The distribution of subjects according to cyclical phases is shown in Figure 3.3.

This result is unlikely as a function of selection bias because the randomisation was ensured and very few clients refused to participate in this study when they were approached. Furthermore, results from studies of the relationship between volunteering behaviours and the stage of menstrual cycle suggested that the selection-bias hypothesis is less plausible. Doty & Silverthorne (1975), based on their own and other's data (Wright & Crow, 1973), suggested that most of the volunteers recruited were in the ovulatory phase, while the nonvolunteers were mostly in the post ovulatory, premenstrual and menstrual phases. From their results, we could expect to recruit more volunteers in the ovulatory phase. On the contrary, the result reported here showed the reversed distribution pattern related to the stage of the menstrual cycle.

One possible reason for this result is that women may choose to attend the salon

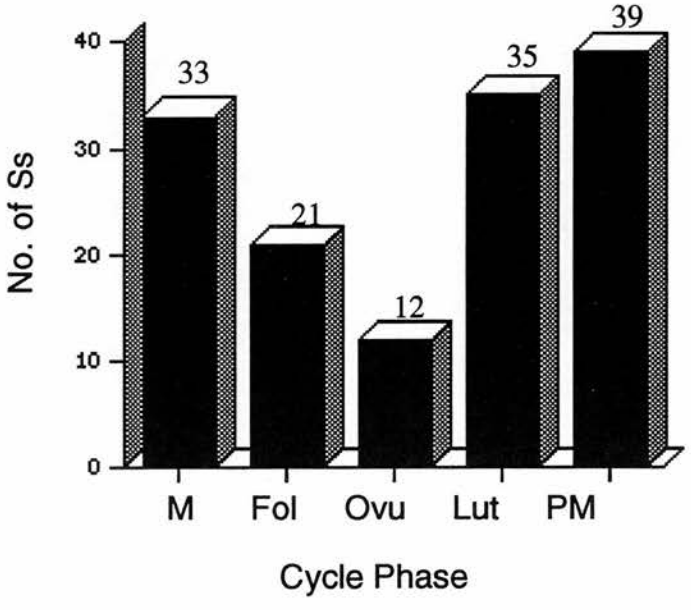

Figure 3.3 Number of subjects attending the hairdressing salon as a function of the cyclical phases.

premenstrually due to their experiencing more negative moods in this phase, and the hair appointments serve to improve their mood states premenstrually in comparison with other cyclical phases. As already shown in Table 3.5, 72 subjects received the tests prior to their appointments and 68 were tested afterwards. It enables the experimenter to examine this *ad hoc* hypothesis. Because of the small number of subjects in the ovulatory phase, the data in the follicular and ovulatory phase were combined together and the phase was alternated as the "intermenstrual" (InterM) phase.

A two-tailed t-test was conducted to examine the effect of hair appointments on mood improvement for each cyclical phase separately. As presented in Figure 3.4, the mood improvement effect was found to be significant only in the premenstrual phase for the component factor of "Distressed Mood" (t= 2.6, d.f.= 37, $p < .01$), especially on particular feelings such as "happiness" (t= 2.7, d.f.= 37, $p < .01$), "activation" (t= 2.8, , d.f.= 37, $p < .01$), and "tension" (t= 2.1, d.f.= 37,$p < .05$). No significant mood improvement effect was found during other cyclical phases. The mean scores for each variable concerned with mood states in the VAS , for immediate pre- and

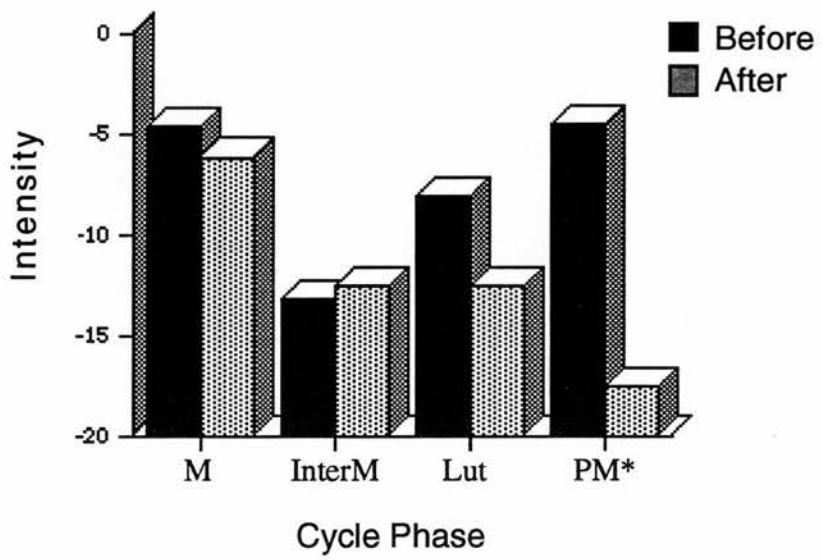

Figure 3.4 Effects of hairdressing appointments on mood improvement across the menstrual cycle. * Mood change as a result of hairdressing appointments is significant in the premenstrual phase.

post- hairdressing appointment, and for each phase of the cycle, is presented in Table 3.6.

3.3.2 Cyclical Variations of Mood and Physiological Complaints

In order to exclude any mood improvement effect of hairdressing appointments, only the data from those who received the tests prior to their appointments were submitted to this analysis. In addition, about one-quarter of these subjects (N=19) were taking contraceptive pills at that time when the experiment took place. As the variations of the natural cycle have been reported to be greatly lessened by the effects

Table 3.6 Mood Improvement Effect for Each Cyclical Phase

Cyclical Phases / Variables in VAS[1]		M Mean (SD)	InterM Mean (SD)	Lut Mean (SD)	PM Mean (SD)	
Happiness	Prior	57.8 (26.5)	69.2 (22.8)	63.6 (22.0)	61.4 (19.8)	a
	After	57.6 (23.7)	68.2 (19.3)	63.1 (21.4)	78.1 (17.0)	a
Activation	Prior	40.1 (17.8)	54.9 (22.2)	47.7 (20.1)	36.6 (23.3)	b
	After	40.0 (29.7)	51.6 (19.2)	56.6 (25.1)	59.2 (27.0)	b
Sociability	Prior	65.7 (22.4)	65.5 (29.8)	64.4 (22.6)	66.5 (18.8)	
	After	61.9 (22.3)	66.0 (17.5)	62.3 (15.9)	71.4 (20.4)	
Irritability	Prior	23.5 (27.6)	20.0 (23.9)	16.9 (22.3)	22.6 (26.3)	
	After	18.0 (23.9)	18.0 (18.1)	14.8 (17.1)	13.6 (18.0)	
Depression	Prior	24.5 (24.5)	19.7 (26.5)	17.8 (18.9)	21.9 (18.5)	
	After	19.9 (24.0)	13.6 (12.1)	22.8 (24.0)	14.9 (20.9)	
Fatigue	Prior	41.9 (28.6)	37.1 (28.3)	44.9 (26.0)	55.8 (30.5)	
	After	53.9 (35.4)	40.6 (26.8)	32.9 (24.1)	40.4 (30.0)	
Tension	Prior	41.2 (31.3)	20.1 (19.9)	39.3 (25.9)	33.0 (25.7)	c
	After	24.7 (25.7)	25.4 (24.7)	23.6 (28.6)	16.9 (19.2)	c
Summary Scores						
Distressed	Prior	-4.7 (14.3)	-13.2 (14.6)	-8.1 (14.7)	- 4.5 (16.2)	d
Mood	After	-6.2 (20.1)	-12.6 (13.2)	-12.5 (18.3)	-17.6 (14.6)	d
Physiological	Prior	28.6 (21.0)	20.3 (14.8)	26.8 (21.8)	27.7 (21.8)	
Sensations	After	26.7 (22.9)	32.3 (18.8)	36.8 (24.3)	25.6 (23.6)	
Physiological	Prior	28.2 (14.6)	23.4 (21.1)	25.0 (17.4)	23.0 (16.5)	
Distress	After	21.0 (12.8)	18.8 (12.5)	22.5 (15.2)	22.2 (19.5)	

[1] Only the individual variables composed of the factor "Distressed Mood" are shown in this table. Summary Scores represent the factors derived from the Principal Component Analysis.

Note: Means which share a common subscript are significantly different from each other at the .05 significance level according to the two-tailed *t* test.

of contraceptive pills, the data from those taking contraceptive pills were further excluded from the examination of cyclical variations in mood and physiological complaints. The selection offered 53 subjects for this analysis.

A univariate one-way ANOVA was conducted to examine the cyclical variations. As presented in Figure 3.5, subjects reported significant fluctuation of mood across the menstrual cycle (F= 2.61, d.f. = 4,48, $p < .05$). No significant cyclical variations in physiological sensations (F= 0.48, d.f. = 4,48, *n.s.*) and distresses (F= 0.70, d.f. = 4,48, *n.s.*) were found. The mean scores for each summary and individual variable of the VAS are presented in Table 3.7.

3.3.3 Effects of Testing Modes on Self-Reports of Cyclical Variations

Self ratings of feeling states were found to be influenced not only by which cyclical phase the subject was in, but also by the administration formats. The effect of

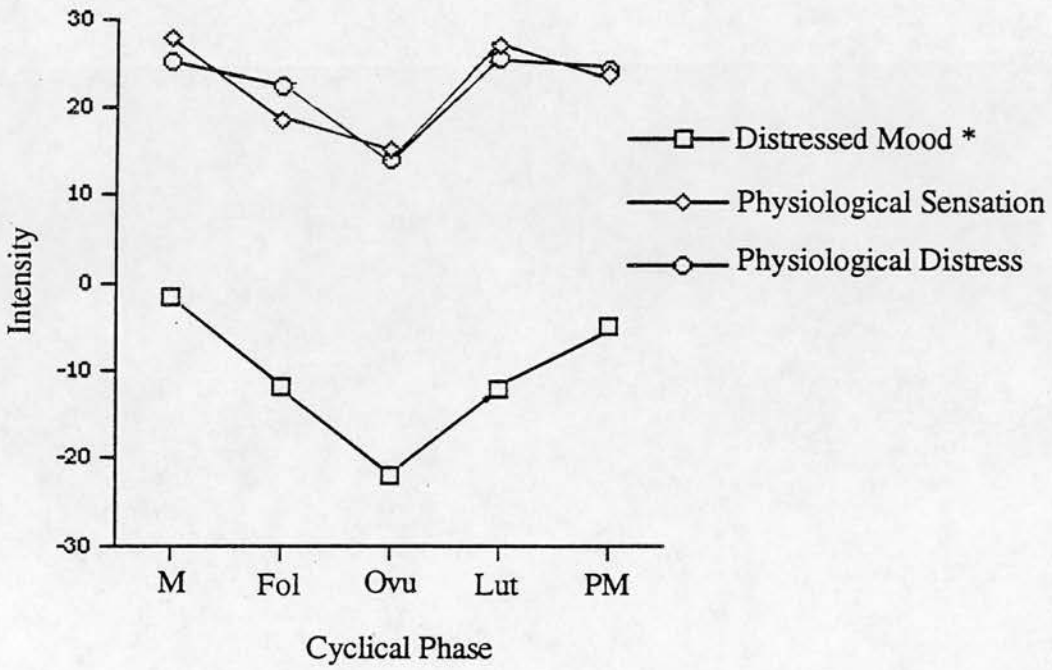

Figure 3.5 Cyclical variations of the menstrual cycle in mood and physiological reactions. * Significant change over the cycle at the $p < .05$ level.

Table 3.7 Mood and Physiological Fluctuation across the Menstrual Cycle.

Phases Variables of VAS	Menstrual Mean (SD)	Follicular Mean (SD)	Ovulatory Mean (SD)	Luteal Mean (SD)	PM Mean (SD)	*F* test
Happiness	53.4 (26.2)	69.0 (23.8)	78.7 (19.6)	69.2 (15.1)	61.4 (21.2)	1.73
Activation	32.7 (12.4)	52.4 (21.7)	59.3 (13.3)	49.9 (18.0)	37.4 (15.1)	2.47
Sociability	60.7 (21.5)	59.1 (29.6)	71.2 (25.6)	66.1 (20.0)	66.1 (20.6)	1.13
Irritability	24.8 (30.3)	18.5 (21.4)	7.0 (5.1)	14.2 (13.1)	24.3 (31.2)	1.07
Depression	27.1 (28.0)	21.8 (29.3)	6.5 (9.5)	14.1 (14.4)	21.5 (18.4)	2.09
Fatigue	47.5 (29.9)	36.1 (28.4)	22.7 (18.0)	43.6 (25.4)	51.0 (32.5)	1.14
Tension	36.0 (28.1)	22.0 (21.8)	18.5 (18.8)	28.9 (18.4)	34.2 (29.9)	0.63
Breast Tenderness	10.4 (8.2)	9.2 (13.6)	13.3 (18.6)	22.0 (27.0)	19.2 (28.5)	0.88
Body Swollen	26.8 (23.3)	21.9 (32.9)	11.2 (15.1)	28.8 (26.5)	19.4 (24.3)	0.77
Period Pain	26.4 (28.6)	27.8 (28.5)	22.8 (21.8)	25.3 (28.0)	38.8 (32.0)	0.57
Craving Sweets	37.9 (31.8)	26.0 (31.2)	15.5 (20.0)	21.8 (21.6)	33.2 (32.2)	0.96
Savoury Foods	36.0 (26.8)	33.1 (32.9)	18.5 (18.3)	43.2 (26.7)	26.0 (29.2)	1.50
Nausea	12.3 (12.7)	16.9 (31.4)	3.3 (4.4)	11.8 (24.7)	9.2 (22.0)	1.24
Thirsty	28.4 (25.0)	15.0 (17.2)	7.5 (9.6)	31.2 (30.0)	20.9 (25.4)	1.09
Hunger	27.1 (30.1)	17.2 (16.2)	19.3 (18.6)	26.8 (28.9)	25.6 (25.0)	0.32
Dry Mouth	27.6 (31.0)	23.7 (28.0)	18.7 (11.3)	22.9 (22.5)	24.4 (29.7)	0.14
Summary Scores[1]						
Distressed Mood	-1.6 (15.0)	-11.7 (14.2)	-22.1 (7.7)	-12.0 (11.8)	-4.8 (19.2)	2.61*
Phy. Sensation	27.7 (22.8)	18.6 (15.1)	15.2 (11.3)	27.0 (21.9)	23.6 (19.3)	0.48
Phy. Distress	25.0 (13.2)	22.5 (23.0)	14.1 (14.3)	25.5 (16.5)	24.3 (18.8)	0.70

[1] Factors derived from the Principal-Component Analysis of the VAS.

* $p < .05$

cyclical phases and testing modalities were examined by conducting a univariate two-way ANOVA for each individual feeling state in the VAS, and a multivariate analysis of variances (MANOVA) for each summary score derived from the principal-component analysis. Table 3.8 and Table 3.9 present the mean scores respectively for the individual and summary variables of the VAS, for each testing modality, and for each cyclical phase.

Significant between-modality differences were found on the summary variable of "Distressed Mood" (Pillai= .27, F= 3.04, d.f. = 7,58, p< .001), and on individual feeling state such as "fatigue" (F= 4.0, d.f.= 1,64, p< .05), "tension" (F= 4.4, d.f.= 1,64, p< .05), and "thirsty" (F= 6.6, d.f.= 1,64, p< .05). Affective ratings on individual feeling state such as "activation" (F= 2.8, d.f.= 3,64, p< .05), "tension" (F = 3.44, d.f.= 3,64, p<0.05), and "craving for sweets" (F= 3.52, d.f.= 3,64, p< .05) showed significantly variation across the menstrual cycle.

The interaction effect was found to be significant on the summary variable of "Distressed Mood" (Pillai= .65, F= 2.38, d.f. = 21,170, p< .001) and the individual mood state such as "activation" (F= 4.4, d.f.= 3,64, p< .01) and "tension" (F= 4.0, d.f.= 3,64, p< .01). The significant interaction effects suggested that subjects reported heightened negative mood in the CBT format during the premenstrual and menstrual phase with converse of the effect during the intermenstrual phase (see Figure 3.6).

3.3.4 Effects of HCI Factors on Computerised Assessment

3.3.4.1 Reduced Social Desirability

It was hypothesised that a lower frequency of endorsement in items with high social desirability would be revealed in the CBT version of the SDS than those tested

Table 3.8 Self-Reports of Mood and Physical Change as a Function of Cyclical Phases and Testing Modes

Cyclical Variables in VAS	Phase	M Mean (SD)	InterM Mean (SD)	Lut Mean (SD)	PM Mean (SD)	F test [1] (Phase)
Happiness	CBT	54.0 (32.7)	90.4 (9.8)	64.5 (20.6)	61.5 (24.1)	
	P&P	59.7 (24.7)	58.6 (19.8)	62.0 (25.9)	61.3 (16.0)	
Activation	CBT	46.2 (24.1)	54.4 (36.1)	50.3 (20.8)	20.6 (20.4)	2.8*
	P&P	37.1 (14.3)	55.2 (13.8)	43.1 (19.4)	51.2 (14.8)	
Sociability	CBT	76.6 (17.6)	71.9 (40.6)	64.6 (25.6)	69.4 (19.5)	
	P&P	60.3 (23.3)	62.4 (24.9)	64.1 (18.2)	63.9 (18.6)	
Irritability	CBT	18.6 (20.2)	18.0 (25.9)	14.8 (13.7)	26.5 (31.6)	
	P&P	25.9 (31.3)	21.0 (24.1)	20.6 (33.4)	19.0 (21.2)	
Depression	CBT	39.4 (29.6)	20.6 (40.5)	17.7 (20.1)	24.1 (19.4)	
	P&P	17.0 (18.8)	19.2 (19.1)	18.0 (18.2)	19.9 (18.3)	
Fatigue†	CBT	57.4 (38.8)	35.6 (38.0)	47.8 (26.0)	69.5 (33.9)	
	P&P	34.1 (20.1)	37.8 (24.6)	39.9 (27.3)	43.2 (21.4)	
Tension†	CBT	73.6 (20.2)	23.0 (24.2)	35.5 (27.4)	36.9 (31.0)	3.44**
	P&P	25.0 (21.6)	18.7 (18.6)	45.7 (23.6)	29.3 (20.3)	
Breast tenderness	CBT	5.0 (5.9)	5.2 (10.5)	15.8 (20.8)	18.3 (30.5)	
	P&P	16.6 (14.4)	12.5 (14.1)	19.0 (32.1)	16.2 (19.0)	
Body swollen	CBT	19.4 (28.5)	26.8 (41.9)	28.3 (26.2)	18.1 (26.5)	
	P&P	26.4 (20.2)	23.0 (24.6)	35.1 (37.2)	16.8 (16.4)	
Period pain	CBT	47.8 (36.6)	29.6 (39.9)	25.5 (26.1)	38.3 (32.4)	
	P&P	22.2 (27.5)	24.5 (19.4)	25.7 (40.2)	23.0 (28.2)	
Craving Sweets	CBT	73.0 (6.4)	19.6 (41.6)	27.5 (23.0)	32.2 (31.4)	3.52*
	P&P	37.2 (35.0)	38.6 (33.6)	15.1 (21.5)	42.8 (29.3)	
Savoury Foods	CBT	35.4 (18.2)	28.0 (41.0)	50.9 (25.6)	26.9 (33.2)	
	P&P	42.0 (33.6)	35.6 (30.7)	16.8 (21.2)	30.9 (27.1)	
Nausea	CBT	19.2 (15.5)	11.0 (18.8)	17.7 (28.1)	11.4 (26.6)	
	P&P	9.5 (8.3)	18.8 (34.5)	14.4 (35.6)	2.6 (3.1)	
Thirsty†	CBT	45.6 (31.9)	32.6 (32.6)	43.1 (31.7)	28.0 (30.3)	
	P&P	26.0 (26.6)	14.2 (10.8)	9.1 (11.3)	30.4 (30.0)	
Hunger	CBT	22.0 (25.3)	4.4 (5.6)	26.5 (31.1)	28.7 (26.5)	
	P&P	30.7 (29.3)	24.3 (18.4)	14.6 (15.0)	22.8 (23.1)	
Dry Mouth	CBT	14.8 (13.8)	19.8 (34.5)	35.5 (31.7)	37.0 (36.4)	
	P&P	30.8 (31.4)	23.4 (23.4)	13.7 (17.6)	20.3 (27.2)	

[1] Effect of cyclical phase is significant at the * $p < .05$ ** $p < .01$ level according to the univariate two-way ANOVA.

† Effect of Test mode is significant at $p < .05$ according to the univariate two-way ANOVA.

Table 3.9 Summary Scores of Mood Change as a Function of Cyclical Phases and Testing Modes

Factors in VAS[1]	Cyclical Phase	M Mean (SD)	InterM Mean (SD)	Lut Mean (SD)	PM Mean (SD)
Distressed Mood†	CBT	1.7 (14.6)	-17.0 (19.6)	-9.1 (14.6)	0.8 (18.6)
	P&P	-7.9 (13.8)	-13.4 (12.8)	-6.4 (15.9)	-9.3 (12.6)
Phy.Sensation	CBT	27.5 (18.4)	18.9 (20.5)	35.1 (22.9)	31.2 (24.0)
	P&P	29.2 (23.1)	21.0 (12.3)	12.5 (9.4)	24.5 (20.0)
Phy. Distress	CBT	33.3 (9.5)	21.7 (34.2)	27.3 (14.6)	24.2 (20.5)
	P&P	25.6 (16.5)	24.2 (13.1)	21.0 (22.2)	22.0 (12.5)

[1] Factors derived from the Principal-Component Analysis.

† Main effect of Test mode and Interaction effect are significant at the $p < .001$ level according to the MANOVA.

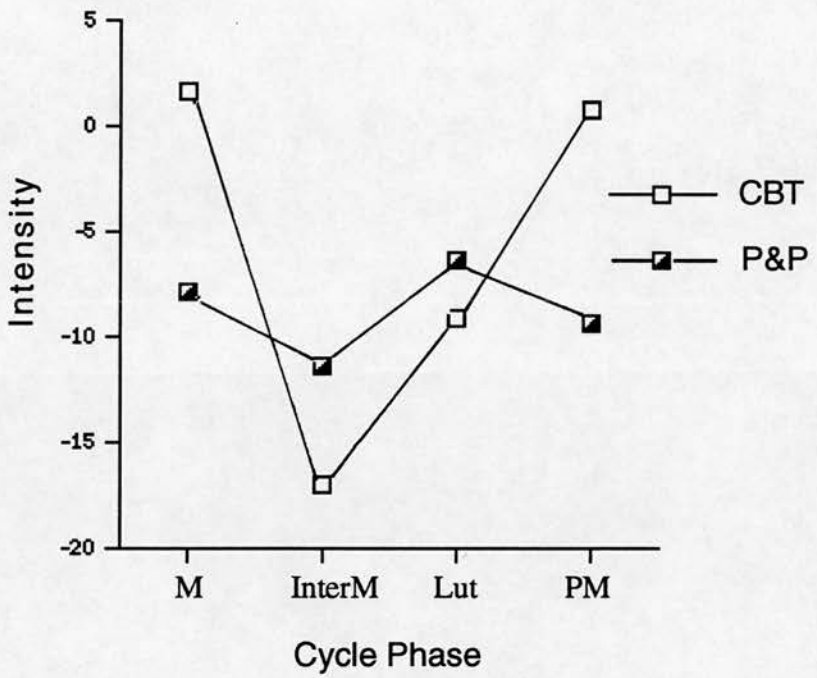

Figure 3.6 The interaction effect of cyclical phases and test modalities on the Principal-Component factor: Distressed Mood.

with the P&P administration. A paired *t*-test was conducted using the data from the 60 retested subjects. The results did not support the hypothesis, showing no significant differences between the CBT (Mean = 33.53, S.D.=4.0) and P&P (Mean = 32.98, S.D. = 4.8) version of the SDS (t= .71, d.f.= 59, *n.s.*).

In addition, no significant correlations were found between the SDS measure and affective ratings tested by either the CBT or P&P administration during any cyclical phase. Therefore, heightened negative mood of CBT is unlikely to be a result of subjects' reduced inclination to respond in a socially desirable way within the HCI context.

3.3.4.2 Familiarity with Computer Use

In order to examine the effect of familiarity with computer use on self-ratings of the VAS across the menstrual cycle, the degree of familiarity was recoded into three levels, namely Low Familiarity (subjects who never or seldom used computers), Medium familiarity (subjects who used computers sometimes), and High Familiarity (subjects who used computers often or very often). A 3 (Familiarity) × 4 (Cyclical Phase) factorial analysis was conducted on the CBT version of VAS for each cyclical phase. Neither the main nor the interaction effects were significant on CBT mood assessment across the menstrual cycle. The heightened negative mood revealed in CBT does not relate to subjects familiarity with computer use.

Subjects familiarity with computer use was found to correlate significantly with the time taken to complete the CBT version of the VAS and SDS (r= -.30, d.f.= 63, p< .05), but no significant relationship was found when tested by the P&P administration (r= .03, d.f.= 53, *n.s.*; 20 subjects were excluded from this analysis due to missing data). This may partly contribute to the significant time difference taken to complete the CBT (Mean = 8.6 min; SD= 2.3) and P&P (Mean = 4.4 min; SD= 1.2) versions of these tests (two-tailed t = 12.0, d.f.= 118, p< .0001).

3.4 Discussion

Mood fluctuation related to the menstrual cycle is obtained showing a peak of negative mood in the premenstrual and menstrual phase with a decline thereafter, and

most positive feelings being in the intermenstrual phase. The relatively mild variations of mood may result from the non-clinical population recruited in this study. It is consistent with observations in previous studies that women without PMS report less significant cyclical change of mood and physical distress than the clinical samples (Hart & Russell, 1986; Metcalf et al., 1989; Sanders et al., 1983).

A central question posed in this study is the equivalence of CBT and P&P mood assessment. The principal-component analysis reveals that the CBT administration shows equivalent internal-consistency reliability as compared to the P&P format (see Table 3.3). When mean score comparison is used, however, subjects reported greater cyclic fluctuation to the computer than did those tested with the paper-&-pencil format (see Figure 3.6). It is argued in Chapter 1 that two testing modalities are psychometrically parallel if the mean scores and rank ordering of scores obtained from one modality are comparable to those obtained from another. Because there are significant mean differences with respect to the stage of the menstrual cycle, the two modalities are clearly not psychometrically equivalent. The findings therefore indicate that affective ratings are influenced not only by underlying biological rhythms, but also by the nature of the instruments employed for mood assessment.

Several HCI factors have been examined to account for this psychometric non-equivalence. Contrary to hypothesis, no evidence was found for the participant's tendency to respond in a socially desirable way or for the subjective level of computer experience to influence this non-equivalence. With respect to the social desirability factor, the results do not confirm findings in the previous literature that the response set of social desirability is reduced in the CBT administration compared to the P&P format (Evan & Miller, 1969; Koson et al., 1970). The present findings, however, are consistent with other followed-up studies, especially those based upon the subscales designed to assess the response set of social desirability (e.g. faking-good or faking-bad scales) in several structured personality inventories, indicating no

substantiate differences of social desirability responses between the two modalities (Stockwell & Jackson, 1983). The effect of the social desirability factor may be potent where the equivalence of CBT-administered and face-to-face interviews are concerned (Lucas et al., 1977; Slack & Van Cura, 1968; Waterton & Duffy, 1984;). But it may be not a very appealing hypothesis where comparisons with P&P questionnaires are concerned because there is no priori reason to suggest that questionnaires are any more "invasive" than computers (Moreland, 1987).

Although it is apparent that subjects' experience with computer use may influence testing performance in CBT (see Chapter 1), no evidence is found in the present study to suggest that affective ratings are influenced by subjects computer familiarity. Perhaps it is because subjects computer experience does not exactly reflect a participant's affective reaction towards computer use which has been suggested to influence the self-reporting processes (George et al., 1992; Messick, 1985). People without any previous experience with computers may not uniformly show adverse reactions to taking a test on a computer. Therefore, merely grouping subjects by their experiences with computer use may be an imprecise predictor of non-equivalence in tests concerning self-evaluation of internal states. As females are generally more likely to experience higher levels of computer anxiety (Brosnan & Davidson, 1994), further research is needed to examine the effect of a subject's affective reactions on the self-reporting processes with a particular emphasis to be placed upon the adequate measurement such as subjective levels of computer anxiety.

A potential factor for the between-modality nonequivalence indicated by the current study is the differences in the administration procedure in terms of item presentation methods and time-to-completion. The CBT administration procedure requires a response to each item before moving on, and only one item is presented at a time. The change of presentation formats not only results in more time being taken to complete CBT, but is also likely to compel more careful attention to each item. On the

other hand, the P&P administration procedure opens the possibility for subjects to keep track of the whole test while responding to each item. A respondent who checks "irritable" on the mood scale may later check "anxious" if the answer can be recalled or determined by looking back. In the light of administration standardisation, the CBT administration is probably psychometrically superior to its P&P counterpart. Nevertheless, the changes in item presentation formats required by computerisation may affect the meaning of responses which in turn result in the psychometric nonequivalence.

The ad-hoc analysis of the observed non-randomised distribution supports the idea that women choose to attend the salon premenstrually because they experience more negative mood during this phase, and the hairdressing appointment serves to improve their premenstrual distressed mood . These findings may add support to the speculation that mood functions as a signal indicating the current state of the self so to enhance self-regulatory behaviours (see Chapter 2). People use various strategies to regulate their mood by modulating negative mood through exposing themselves to self-reinforcing events, i.e. pleasure producing action intended to improve moods (see Morris, 1989 Chapter 5 for a review). With this understanding of the self-regulatory nature of mood, the observations about non-randomised distribution across the menstrual cycle become much more understandable. Women generally experience mood changes across their menstrual cycle, with greater negative mood dominant in the premenstrual and menstrual phases. Such psychological and physiological changes for most women are not serious, but may be sufficiently act as a signal to increase attention from social companions or to increase the tendency for self-reinforcing behaviours.

The question raised here is why attending a hairdressing salon has such psychological effects on mood improvement, especially when women are premenstrually distressed. The perceived effectiveness of hairdressing by women

varying across the menstrual cycle may suggest that it is not the professional hairdressing activity *per se*, rather there are more important factors which influence the perceived effectiveness on mood improvement. Morris (1994), based on the observations of animal's and human's "grooming demands," speculated that hairdressing as a pattern of behaviour has three functions. It not only cleans the hair and provides an outlet for social grooming, but it also decorates the groomee. Although grooming activities still have the vital task of keeping the hair clean, the motivation for such activities appears to have become more social than cosmetic. In a hairdressing salon, the customer can indulge in the groomee role of talking about her own personal problems when her hairdresser usually listens to her sympathetically. Hairdressers are often acknowledged as one of potential help-giving sources in the social networks of society (Cowen et al., 1979; Milne & Mullin, 1987; Wiesenfeld & Weis, 1979). In an interview survey of 90 hairdressers in the Rochester area, New York, Cowen et al. (1979) found that approximately one third of the time hairdressers spent talking to customers are devoted to discussion of the customers' moderate-to-serious problems, such as personal difficulties in dealing with children, physical health, marriage, depression and anxiety. Indeed, when working in this present study this experimenter observed that some hairdressers not only talked with customers about their personal problems, but also more actively provided information about, and encouraged their clients to contact with appropriate social support systems for domestic violence or marriage guidance (e.g. Women's Aid National Helpline).

According to Morris (1994), one more important trend has evolved out of simple needs for grooming and body decoration is medical care. He suggested that minor infections and sicknesses such as coughs, colds, backache, headache, and sore throats , may in reality relate much more to primitive "grooming demands." Such minor medical symptoms are common examples of so-called "grooming invitation ailments" (Morris, 1994, p.142). Such symptoms act in the same way as grooming invitation

signals, releasing comfort behaviour from doctors, nurses, chemists, relations, or friends. In the case of medical care, the administering of pills and medicines replaces the ancient grooming actions and provides an occupational ritual that sustains the groomee-groomer relationship through this special phase of social interaction. Following this speculation, we may expect to find a similar pattern of non-randomised distribution in women visiting their GP.

The present results not only support that hairdressers are important informal care givers, but also show that part of their helpfulness relies on improving their clients' mood, especially for those who have already experienced negative mood as a result of any endogenous or external events. Implications of the non-randomised distribution finding for the conduction of medical care are that clinicians need to be aware of the possibility that there may be menstruation-associated changes in the severity of self-reported symptoms and the perceived effectiveness of the treatment. Clinicians should take such changes into account in their treatment and management of the clients. Clinicians should also monitor their female subjects to determine if, and to what extent, they manifest premenstrual dysphoric mood and behavioural changes.

CHAPTER 4
ITEM PRESENTATION FORMAT AND MOOD MEASUREMENT

4.1 Introduction

To make the questionnaire presentation truly identical between a CBT and P&P format is not feasible, largely because of computer hardware constraints. The normal size of a computer visual display unit does not allow presentation of all questionnaire items at the same time without sacrificing clarity of presentation. Thus, on CBT items are usually presented individually, while on P&P tests they are presented in groups. The advantages of such computerised item presentation is the elimination of missing items, and also the compelling of respondents to pay more attention to each item (Hofer & Green, 1985; Waterton & Duffy, 1984). In terms of testing administration standardisation, computerised item presentation may be superior to its conventional counterpart.

Also relevant to the variation of item presentation formats is the time required to complete a test. Previous studies have often reported that there is a significant time-to-completion difference between administration modalities. However, the conclusion as to which modality is less time consuming differs across these studies because of the varying software design, selection of response devices and the content nature of tests used for comparison. For example, using a true-false response format and a keyboard response device, CBT administration of the Minnesota Multiphasic Personality Inventory (MMPI) has been consistently reported to require significantly less time to complete or is perceived as being quicker than the booklet version (see Honaker, 1988 for a review). In contrast, this experimenter's previous studies suggested that CBT administration of mood assessment with a computer mouse as the response device requires more time in completion than answering on paper with a pencil (Tseng et al., 1992).

Variation of item presentation and time-to-completion between the modalities may be responsible for the differences in the results obtained from ability tests. Dimock & Cormier (1991) suggested that performance on a verbal reasoning test is significantly affected by format differences between presenting items in group (i.e. the P&P format) and presenting them individually (i.e. the CBT format). Although the effect of item presentation factors is potent upon performance of ability tests (see Mead & Drasgow, 1993 for a review), it is currently unclear to what extent such differences may affect self-reporting processes in personality tests. Nevertheless, indirect evidence might be obtained from studies concerning format differences between presenting items in the booklet and card form of the MMPI (Dahlstrom & Welsh, 1960). The procedure for the card-administered MMPI presents a single item on an index card. Subjects are instructed to read each statement and answers are made by putting the card in one of three boxes labelled as "TRUE," "FALSE," or "CANNOT SAY." In the booklet form, items are presented in groups on several paper sheets, and subjects make their own record of the replies to the items. With respect to item presentation, both the CBT and card administration present items individually in comparison with the booklet format presenting them in groups. Thus, examining the reports about the comparison between the card- and booklet-administered MMPI furnish indirect evidence concerning effects of item presentation factors upon the self-reporting processes.

The early literature about the equivalence of the two forms has been reviewed by Dahlstrom & Welsh (1960). Two studies (MacDonald, 1952; Wiener, 1947) found no stable psychometric differences between the modalities for most of the scales. McQuary and Truax (1952) retested 100 male freshmen who had initially been tested with the booklet administration on admission to the university within a period of 3 to 178 days when they appeared at the student counselling centres. Booklet administration gave consistently higher scores than the card version, but it could have

been confounded by sampling bias, in that their subjects were more emotionally disturbed, and also by testing order, which was not counterbalanced in their study (see Dahlstrom & Welsh , 1960).

Using a within-subject and counterbalanced design, Cottle (1950) found that his 100 college students gave slightly higher scores on the booklet than card format. Subjects also put fewer items in the "Cannot Say" category in the booklet version, which probably contributed to the higher scores on that administration. This finding of between-format differences in the "Cannot Say" category is interesting because other studies have also reported differences with this category when comparing the booklet with the CBT-administered MMPI (see Honaker, 1988). The results imply that item presentation may alter an individual's tendency to give evasive responses to personality items in a True-False format (see Edwards & Walsh, 1964 for the factor analysis of "Cannot Say" scores).

From these studies, Dahlstrom & Welsh (1960) suggested that it is difficult to draw any firm conclusion as to what extent the item presentation factors affect the test results. Studies based on the same subjects may invariably provoke distortions from memory of earlier responses, familiarity, and test sophistication. By counterbalancing the order of presentation the systematic variance may be controlled, but any special interaction effects between familiarity and test formats cannot be eliminated. Furthermore, the card format of the MMPI is generally considered less demanding for the subjects and requires less time in completion than the booklet form. These factors are not considered in these studies but may be important in influencing test results.

Nevertheless, the card administration can be taken as an analogy of computerised test in terms of item presentation. By presenting items of the conventional P&P form individually on a card, the item presentation and time-to-completion may become more equivalent to that of the CBT modality. If the obtained non-equivalence of CBT and P&P mood assessment (i.e. Chapter 3) results from

differences of item presentation and time-to-completion, the employment of the card administration should eliminate such variation in the obtained mood scores. This hypothesis was examined in a pilot study run by this experimenter. A card administration of mood assessment was devised. In this study, 27 university students received the shortened version of Activation-Deactivation Adjective Check List (AD ACL; Thayer, 1989) administered in either the card ($\underline{N}$ = 13) or CBT ($\underline{N}$ = 14) modality. Despite controlling for the item presentation and time-to-completion, heightened feeling of "tiredness" was reported in the CBT version. The findings suggested that item presentation factors alone may not result in the between-modality nonequivalence of mood assessment. Nevertheless, the conclusion derived from this pilot study using a between-participants design needs to be tentative because the non-equivalence of mood assessment may be attributed to random group differences.

Therefore the next experiment asked whether the heightened negative mood of CBT is because of differences in terms of item presentation and time-to-completion. If format differences are responsible for the observed non-equivalence result, there should be no between-modality differences using the CBT and card administration matched for item presentation and time-to-completion. In addition, self-report measurement of mood has been criticised as being vulnerable to problems such as subjects' desire to accord with other's expectations or their achieving a favourable self-presentation (Nisbett & Wilson, 1977; T. D. Wilson et al., 1982; see also Chapter 2). It is not uncommon, therefore, for researchers to employ measures of psychomotor activities to validate self-reported data. Psychomotor tasks which were found to correlate with naturally occurring mood (i.e. Mayer & Bremer, 1985) were employed to validate self-reported measurement of mood.

4.2 Methods

4.2.1 Subjects and Study Design

Subjects were 42 volunteer secondary school students, recruited when they visited the Psychology Department on University of Edinburgh Open Days for schools. Subjects were randomly assigned to one of three experimental conditions, i.e. the CBT, card, and P&P condition. There were 16 participants (13 females and 3 males) in both the CBT and card conditions, and 10 female participants in the P&P condition. In both the CBT and card conditions, the participants were administered both the CBT and card administration of mood assessment. Order of the administration format were counterbalanced. In the P&P condition, participants were tested in the P&P format. Figure 4.1 presents the study design and procedures.

This design allowed the comparison amongst these administration modalities, using a between-subjects design, from the initial session. Furthermore, both the computer and card conditions involved a 2 X 2 mixed design with the test format (computer versus card) as a within-subjects variable, and the testing order (computer-first versus card-first) as a between-subjects variable. By counterbalancing the order of presentation and collecting the data from the same participant, the systematic variance which may influence the equivalence of test formats was better controlled.

4.2.2 Card-Administered Mood Assessment

As presented in Figure 4.2, an apparatus was devised for the card administration of mood assessment. This is made of wood with a height of 32-cm and a 20.5 X 37 cm bottom plate. A lever arch ring binder as a card holder was fixed on the anterior shelf which was set on a slant.

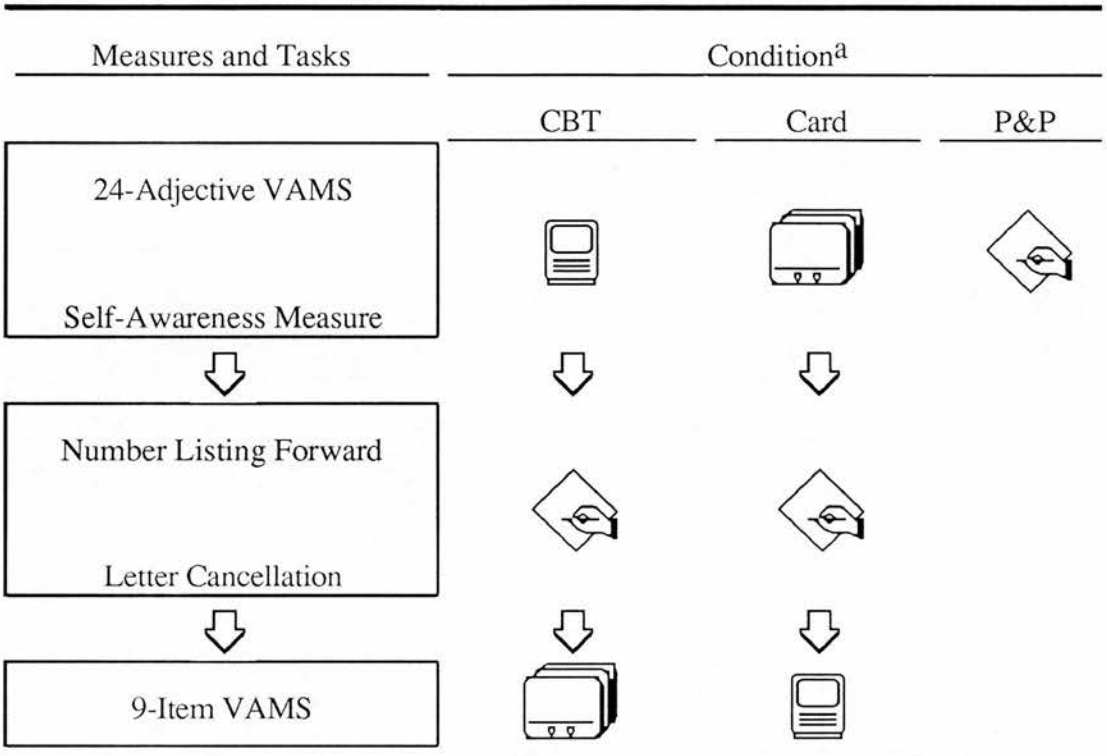

Figure 4.1 Study Design and Procedures. [a] N = 16 in the CBT and card condition and N = 10 in the P&P condition. The icons indicated the administration formats of each measurement or task under the conditions.

Each item drawn from the conventional P&P mood scales were printed on a 20.4 X 12.7 cm index card separately. The cards were punched and numbered in sequence as in the standard P&P format. For administration, all the cards were set on the upper ring of the binder. A blank answer sheet with item numbers and response scales were supplied. Following the completion of each item, subjects moved on by turning the present card to the bottom ring.

4.2.3 Computer-Administered Mood Assessment

The computer system involved a colour Macintosh Classic computer with a keyboard and a computer mouse. The details of software design rationale are as described in Chapter 3. The test procedures were programmed in the HyperTalk

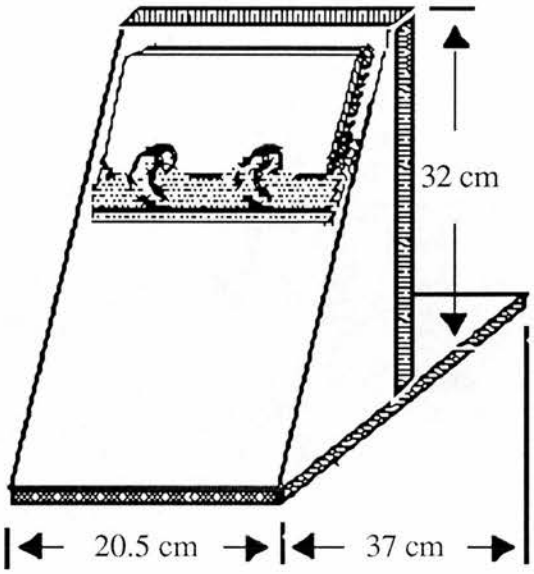

Figure 4.2 Apparatus for the Card Administration of mood assessment

programming language of the HyperCard system. At the beginning of each test, instructions were presented on the screen so that subjects were able to carry out the procedures at their own pace.

4.2.4 Measurements

The measurements employed in this study included two visual analogue scales, a Linguistic Implications Form, and two psychomotor tasks (examples of these measurements are presented in Appendix I). The Linguistic Implications Form consists of 5-items and is employed as a measure of self-focus attention (Wegner & Giuliano, 1980). In this task, subjects are asked to fill in a blank within a sentence with one of three pronouns which seems to fit best in the sentence. The total number of first-person singular pronoun chosen by the subject for these items served as the summary index of self-focused attention. The details and results of this measure will be discussed in Chapter 7.

The characteristics of the mood scales and psychomotor tasks are described as follows:

(1) *Visual Analogue Mood Scales (VAMS).* The VAMS consists of 24 mood adjectives drawn from Nowlis' Mood Adjective Check List (Nowlis, 1965). Eight factors of mood states were derived from the scales by clustering related adjectives. The factor names and the corresponding individual mood adjectives are listed in Table 4.1. An alternative 9-item VAMS was devised and most items were drawn from the VAS used in Chapter 3. These items paralleled the meaning of the factors in the 24-adjective VAMS.

(2) *Psychomotor Tasks.* Two psychomotor tasks which have been suggested to correspond with self-reported transient mood states were employed in this study, i.e. the Number Listing Forward and Letter Cancellation task (Mayer & Bremer, 1985). The time limit for each task was 40 seconds and the tasks were administered individually. Subjects were instructed before these tasks to, "Work as quickly as you can." A stop watch was used to control the timing.

Number Listing Forward. Subjects were asked to list the numbers forward from 103 increasing by 1s on a blank sheet of paper.

Letter Cancellation, All Letters. This task consisted of a table of random letters (11 columns X 20 rows). The participants were instructed to put an individual, vertical line through each letter.

4.2.5 Procedure

Participants were tested individually in a cubicle of the Departmental Practical Class laboratory. The cubicle was equipped with a colour Macintosh Classic computer. The apparatus for the card administration was set up beside the computer. There was a spare table set beside the computer for administering the psychomotor tasks. The participant sat in a chair facing away from the experimenter who, positioned behind, was out of sight when she/he engaged in the tests. Time required to complete each test was recorded by the experimenter with a stop watch.

Table 4.1 Mood Factors and the Componet Adjectives in the 24-Adjective VAMS

Mood Factors	Mood Adjectives		
Aggression	defiant	rebellious	angry
Anxiety	clutched up	fearful	jittery
Surgency	carefree	playful	witty
Concentration	concentrated	engaged in thought	intent
Fatigue	drowsy	dull	sluggish
Social Affection	affectionate	forgiving	kindly
Sadness	regretful	sad	sorry
Vigour/Activation	active	energetic	vigorous

The participants were given the 24-adjective VAMS and the Linguistic Implications Form in the format according to their assigned condition. After completing these tests, subjects in the P&P condition were thanked for their help and assured of their response confidentiality, while those in other two conditions were continuing with the psychomotor tasks. The experimenter then gave the instructions for the psychomotor tasks:

> "You will be asked to list numbers from 103 increasing by one for 40 seconds. That is, you put 103 first and then 104 and so on. Remember to work as quickly and list as many numbers as you can. I will tell you when the time is up. Please begin to write down these numbers after I say 'start now'."

They were then asked if there were any questions about the task. After completing the number listing task, similar instructions were given for the letter cancellation task. Following the psychomotor tasks, the participants were given the 9-item VAMS administered in the reverse format according to their initial test. The whole procedure lasted about 10 to 15 minutes.

4.3 Results

4.3.1 Check of Time-to-Completion

Time required for the card and CBT administration of the 24-adjective VAMS was similar and both took significantly longer than that required for the P&P administration.

The mean administration time for each modality of the VAMS is shown in Table 4.2. A *t* test revealed that no significant differences were found between the card and CBT administration (t = 0.64, d.f. = 30, *n.s.*), and both modalities required significantly more time than that for the P&P administration ($p < .0001$). The results suggest that the card and CBT administration is matched with respect to item presentation format and time-to-completion.

4.3.2 Correlation between 24-Adjective and 9-Item VAMS

Pearson product-moment correlation analyses were conducted to examine the agreement between the 9-item and the 24 adjectives mood scales. These correlations were computed between both VAMS scores for the total sample without taking administration formats into account. When data measured by the two modalities were combined, coefficients were significant beyond the .05 level and ranged from a low

Table 4.2 Administration Time of 24-Adjective VAMS for each Modality.

	Test Mode[a]		
	CBT	**Card**	**P&P**
	M (SD)	M (SD)	M (SD)
Time (minutes)	3.2 (0.5)	3.3 (0.7)	2.1 (0.4)

[a] N = 16 for the CBT and card administration and N = 10 for the P&P group.

+.36 to a high of +.80 (see Table 4.3). The results suggested that the ranking order of mood scores obtained in the CBT modality is comparable to that in the card modality.

4.3.3 Effects of Administration Formats on Affective Ratings

Affective ratings as measured by the 24-adjective VAMS were affected by the administration modality. A univariate ANOVA (CBT vs. card vs. P&P) showed a significant effect of administration formats on self-reported mood scores of "surgency" ($F = 3.13$, d.f. = 2,39, $p < .05$) and "fatigue" ($F = 3.22$, d.f. = 2,39, $p < .05$).

Separate t tests for comparisons of each paired administration modalities revealed that subjects administered by the CBT format reported higher scores on mood states of "surgency" ($t = 2.59$, d.f. = 30, $p < .05$), "concentration" ($t = 2.56$, d.f. = 30, $p < .05$), and "fatigue" ($t = 2.39$, d.f. = 30, $p < .05$) than the card group. Higher CBT scores of "fatigue" ($t = 2.17$, d.f. = 24, $p < .05$) was found in comparison with those measured by the P&P administration. There was no significant differences between the card and P&P administration although higher mean scores of some mood

Table 4.3 Correlation Coefficients between the CBT and Card Administration of VAMS.

	Condition		
Mood Scores	**CBT**	**Card**	**Combined**
Surgency	.70***	.32	.36*
Activation	.92****	.70***	.80****
Sociability	.33	.54*	.42*
Anxiety	.55*	.40	.43*
Fatigue	.69***	.40	.59****
Sadness	.82****	.55*	.64****
Aggression	.46	.38	.41*
Concentration	.60**	.72***	.57****

* < .05 ** < .01 *** < .005 **** < .001

factors were found in the P&P format (see Table 4.4).

The differences of mood scores between the card and CBT administration were also obtained by the within-participants analysis. Data in both the CBT and card conditions were submitted to a 2 (order: CBT-first versus card-first) X 2 (administration format: CBT versus card) ANOVA. Significant main effects of testing mode were found on mood scores for "activation" (F = 11.2, d.f. = 1,30, $p < .005$), "surgency" (F = 15.9, d.f. = 1,30, $p < .0001$), "sociability" (F = 31.9, d.f. = 1,30, $p < .0001$), and "anxiety" (F = 4.7, d.f. = 1,30, $p < .05$). There were no significant main effects of testing order on any self-reported mood scores. The interaction effects of the order by administration formats were found to be significant for affective ratings of "activation" (F = 9.1, d.f. = 1,30, $p < .005$), "surgency" (F = 5.9, d.f. = 1,30, $p < .05$), and "concentration" (F = 6.9, d.f. = 1,30, $p < .01$). The significant interaction effects indicated that these mood scores are in general higher in CBT, and the between-modality disparity of self-reported mood scores was more significant when subjects were given the card format first (see Figure 4.3).

4.3.4 Affective Ratings and Psychomotor Performance

The mean scores of subjects' performance on the number listing forward task was 30.12 (SD = 4.9). Five subjects conducted the letter cancellation task incorrectly, i.e. deleted letters with horizontal lines rather than vertical lines. Their data were excluded from any analyses involved with this task. The mean score for the 27 subjects on this task was 82.3 (SD = 16.3) letters.

Pearson product-moment correlation analyses showed subjects' performance for the number listing task did not correlate with their VAMS scores administered by the two modalities of the VAMS (see Table 4.5). Their performance on the letter cancellation task correlated significantly and positively with self-reports of positive

Table 4.4 Mean Scores of Self-Reported Mood as a Function of Administration Mode and Order

	Administration Mode		
Mood Scores	**CBT**	**Card**	**P&P**
Surgency			
24-Adjective VAMS	45.10 (13.7)$_a$	31.28 (18.7)$_a$	43.20 (21.5)
9-Item VAMS	57.88 (22.0)	53.12 (21.2)	
Activation			
24-Adjective VAMS	42.75 (24.3)	34.65 (18.3)	39.67 (19.2)
9-Item VAMS	49.19 (20.6)	43.50 (26.4)	
Sociability			
24-Adjective VAMS	50.27 (16.9)	39.25 (15.7)	51.63 (19.3)
9-Item VAMS	62.62 (20.2)	63.06 (15.0)	
Anxiety			
24-Adjective VAMS	20.52 (12.8)	18.54 (16.9)	18.17 (22.6)
9-Item VAMS	33.75 (28.1)	23.00 (22.1)	
Fatigue			
24-Adjective VAMS	41.13 (23.6)$_{bc}$	29.27 (14.9)$_c$	23.41 (13.0)$_b$
9-Item VAMS	37.44 (22.6)	41.62 (29.4)	
Sadness			
24-Adjective VAMS	15.46 (14.9)	18.40 (19.0)	12.77 (12.9)
9-Item VAMS	21.19 (22.2)	19.81 (15.6)	
Aggression			
24-Adjective VAMS	17.84 (11.8)	17.79 (14.4)	17.07 (21.2)
9-Item VAMS	11.62 (17.0)	15.69 (17.8)	
Concentration			
24-Adjective VAMS	59.21 (17.6)$_d$	43.42 (17.3)$_d$	45.87 (25.4)
9-Item VAMS	54.00 (26.9)	51.31 (26.0)	

Note. Means on each line which share a common subscript are significantly different from each other at the .05 significance level according to *t* test.

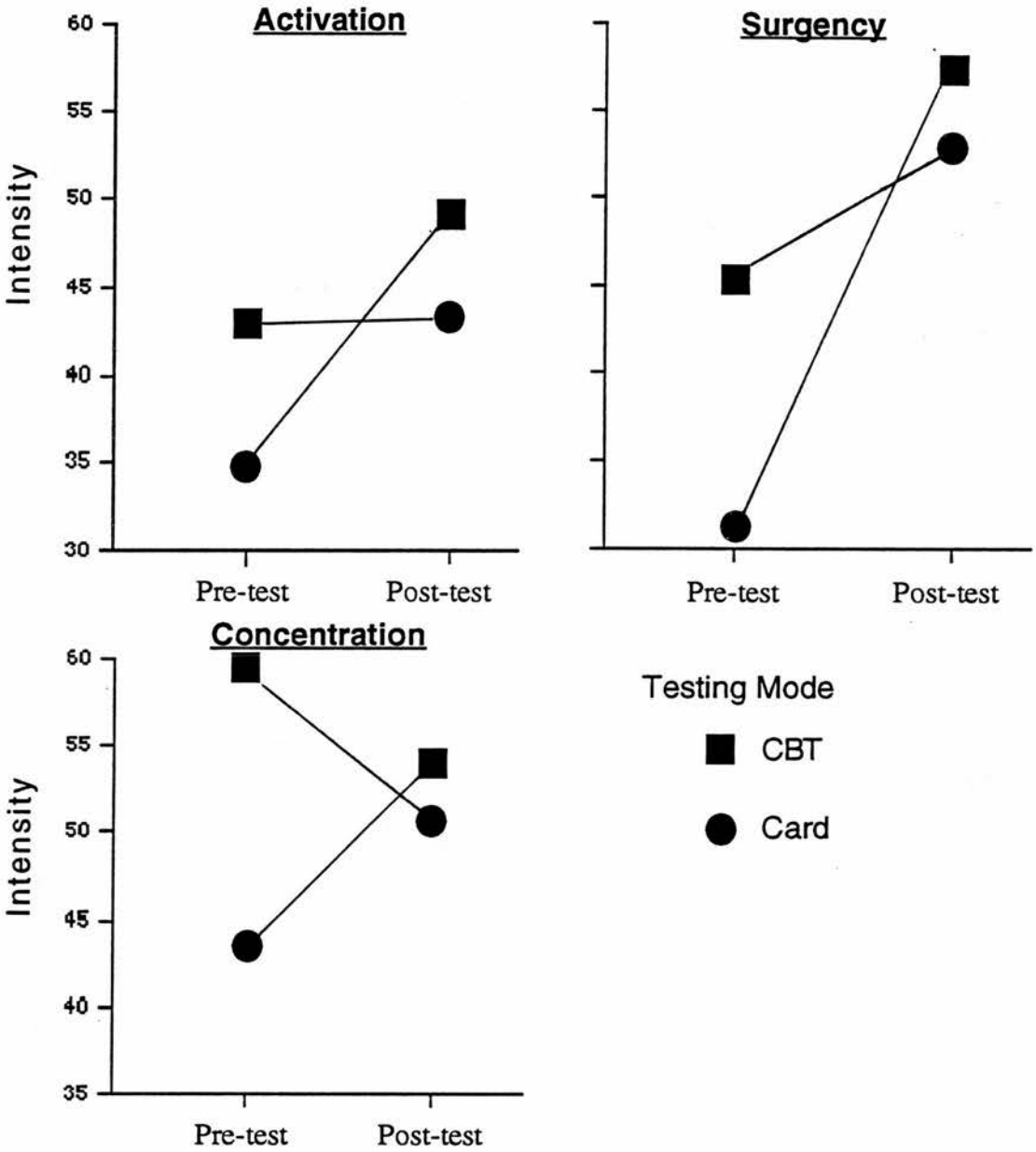

Figure 4.3 Interaction effects of administration modality and testing order on affective ratings

Table 4.5 Correlation Coefficients of Psychomotor Tasks and Self-Reported Mood Scores for Each Administration Mode.

		Administration Mode	
Mood Scores	**Tasks[a]**	**CBT**	**Card**
Surgency			
	Number List	0.11	0.07
	Letter Cancel	0.46*	-0.28
Activation			
	Number List	0.01	0.03
	Letter Cancel	0.18	-0.01
Sociability			
	Number List	0.21	0.28
	Letter Cancel	0.44*	-0.02
Anxiety			
	Number List	-0.24	-0.24
	Letter Cancel	0.28	-0.00
Fatigue			
	Number List	-0.11	0.11
	Letter Cancel	0.07	0.04
Sadness			
	Number List	-0.18	-0.02
	Letter Cancel	-0.01	-0.13
Aggression			
	Number List	-0.17	-0.15
	Letter Cancel	-0.16	-0.21
Concentration			
	Number List	0.25	0.04
	Letter Cancel	0.24	0.19

[a] N = 32 for the Number Listed Forward task and N = 27 for the Letter Cancellation task. * $p < .05$

mood such as "surgency" ($r(25) = 0.46, p < .05$) and "sociability" ($r(25) = 0.44, p < .05$). No significant correlation existed between the measure of letter cancellation and mood scores tested in the card format.

4.4 Discussion

Card-administered mood assessment used here has been shown to provide a successful manipulation which simulates CBT as closely as possible in terms of items presentation and time-to-completion. The mean differences in affective ratings observed in the pilot study are replicated in the present study in a within-participants

design, indicating that it cannot be attributed to random group differences. Despite controlling for the above, CBT mood assessment remains significantly different from that measured by the card administration. The current findings suggest that item presentation factors alone do not account for the psychometric differences found between CBT and P&P mood assessment as described in Chapter 3.

Much of the between-modality variance appears to be attributable to the relatively higher scores revealed in the CBT administration (see Figure 4.3). The comparison between the CBT and P&P administration shows results consistent with previous studies (George et al., 1992; Tseng et al., 1992), indicating that heightened negative mood is revealed in CBT. In comparison with the card administration, higher ratings on positive mood states were revealed in CBT. Empirically there is no immediately apparent explanation for the finding of positive mood being heightened in the computer modality, but a potential factor may be the participant's familiarity with these administration formats. Familiarity or sophistication with a psychological instrument refers to the extent to which a person may have experience with a particular test and hence is aware of the general nature and procedure in use (see Chapter 2). With respect to subject's familiarity with the three administration modalities, the card administration perhaps appears to be most novel to the participants, while they are most familiar with the conventional P&P format. Unfamiliarity with a particular test format may influence an individual's emotional reactions towards the test, which may in turn become more subjectively salient than the underlying mood and influence the between-modality equivalence of mood assessment.

The measurement of psychomotor performance correlated moderately with self-ratings of mood scores in CBT. The moderate correlation may be due to both self-reports and motor performances detect different manifestations of mood (Mayer & Bremer, 1985). Self-reports are informative about mood when it occurs in focal attention, but the processes may be easily influenced by situational factors (e.g. the

administration formats). On the other hand, measures of psychomotor performances are more effective in assessing mood in its manifestation as being inaccessible to consciously introspective processes. The behaviourally-oriented construction of mood measurement may tell us more about how mood in its unconscious manifestation influences other cognitive functions and behaviours.

The present study does not, however, demonstrate what is the direct effect of item presentation factors on mood reporting. A direct comparison between the test formats is difficult because the interaction effects between item presentation and other HCI factors cannot be eliminated. The item presentation factors may interact with a respondent's characteristics related to a particular assessment modality which in turn affect self-reporting processes when administered with this modality. Converting a P&P test into a CBT format may change not only the item presentation but also the respondent's perception of such presentation. Methodological strategies and research needs for examining the effects of the human-computer interface upon self-reporting processes can be found in the article of Honaker (1988). Further evaluation of the extent to which the between-modality non-equivalence is attributable to the human-computer interface factors is needed.

CHAPTER 5
VELTEN MOOD INDUCTION PROCEDURE

5.1 Introduction

Experimental studies in which mood is manipulated appear to offer a pathway to understand the effects of particular mood on cognition and behaviour. Thus, interests in mood studies in recent times have led to the development of a wide range of methods for inducing temporary mood states in the laboratory. Martin (1990), in a recent review article, listed 16 types of mood induction procedures used in the laboratory. These utilise either self-statement, music, incremental music, hypnotic suggestion, facial expression, game feedback, social feedback, solitary recollection, social recollection, autobiographical recall, imagery, empathy, experimenter behaviour, film, threat, and public speaking. Clearly, some of these methods are closely related to one another. For example, the self-statement procedure instructs the participants to be responsive and receptive to the idea of the statement suggested, which is similar to hypnotic suggestion and imagery in many ways. The solitary recollection, social recollection, and autobiographical recall procedures all affect mood by manipulating the content of recollection in which individual is instructed to recall and concentrate on either positive or negative experiences. The music and incremental music procedures employ depression or elation-producing music. But the "incremental music procedure", unlike the "music procedure", does not inform the participants that the music is expected to change their mood.

Perhaps the most important single distinction which emerges amongst the different techniques is for those in which the subjects are aware that a particular mood is being induced, and those for which this is not so. A considerable number of manipulation procedures require a subject's own efforts to change his or her mood. These efforts are aided by the experimenter or by experimental materials which range

from simple verbal statements, through imagery and music to stories and film. For such techniques, subjects can either infer what their likely target mood becomes or else may be explicitly informed of it. In other cases, the mood is manipulated by the experimenter without the subject's awareness. Martin concluded that the two groups of techniques differ generally in at least three important ways; on success rates, on ethics, and on demand effects. With respect to the success rates, the first group of techniques appears to be particularly effective. Ethically, they also have the advantage that a participant is aware of the way in which his or her mood is being manipulated. The second group of techniques do, however, provide less opportunity for demand effects.

The most widely used among these experimental techniques is the Self-Statement procedure, also called the Velten Mood Induction Procedure (VMIP) to give acknowledgement to Velten (1968) who originally developed the procedure. Indeed, a review which dealt solely with this procedure noted that more than 40 studies have employed the VMIP, or minor variants of it (Kenealy, 1986). In the original research by Velten, the procedure involved three sets of 60 statements which were either neutral, increasingly positive, or increasingly negative in terms of their affective tone. The relevant statements were all typed entirely in capitals on index cards, and were presented individually to subjects by the experimenter. Each statement is read silently and then aloud by the subjects, who were instructed and urged to "try to feel the mood suggested by the statements" (Velten, 1968 p. 474), for 20 seconds.

Since the time of his pioneering work, the VMIP has often been modified. Some studies have employed group administration (Albersnagel, 1988; Polivy & Doyle, 1980), and sometimes had subjects read the statements silently (Polivy & Doyle, 1980), others have employed a microcomputer as a presentation instrument instead of the index cards (Blackburn et al., 1990). Some have varied the number and content of statements (Seibert & Ellis, 1991; Teasdale & Forgarty, 1979; Teasdale &

Russell, 1983), or extended them to address anxiety mood induction by developing an additional set of 50 self-referent statements (Orton et al., 1983).

The results of a wide variety of studies, which have employed the VMIP or its minor variants, have apparently been consistent with predictions when assessed by self-report measures of mood change (see Clark, 1983; Goodwin & Williams, 1982; Kenealy, 1986 for reviews). With respect to the VMIP research and its implications for clinical depression, several authors have reviewed this area and concluded that the balance of evidence suggests that mood induction research is a viable model of clinical depression (Clark, 1983; Goodwin & Williams, 1982). Kenealy (1986), after reviewing 40 experiments which have employed the VMIP, concluded that results from studies using self-report measures are generally more consistent than behavioural measures. With regard to the apparent superiority of self-report over behavioural measures, it may be that the behavioural variables show only weak differences as a result of the VMIP, or it may be that the self-report measures are particularly susceptible to the demand characteristics of the experimental situation. The issue of experimental demand characteristics is particularly relevant to the adequacies of the VMIP as an experimental manipulation tool for studies concerning the effects of induced mood on subsequent cognition and behaviour.

Whether the VMIP can aid an understanding of the relationship between mood and its consequent behaviour and cognition remains controversial. It is my contention that the VMIP has a clear use, however, in examining in greater detail the self-reporting processes of mood change themselves because many of the studies have consistently demonstrated significant differences in self-report mood assessment as a result of the VMIP. This chapter evaluates the VMIP along a number of methodological dimensions relating to its effectiveness as measured by self-reports, including the content types, instructions, exposure time to each statement, and the number of statements used, together with the range and duration of induced mood.

The second half of this chapter reviews the criticisms associated with the VMIP, particularly the presence of demand effects. Individual differences of responsiveness to the VMIP are then explored in greater depth.

5.2 Methodological Evaluation of the VMIP

The VMIP requires a subject's own efforts to change his or her mood and these efforts are aided by instructions and verbal statements. The effectiveness of the VMIP may depend particularly upon the instructions, and the content of given statements. In addition, a number of criteria used in the procedure may influence the outcome of the manipulation. Those to be considered here comprise exposure time to each statement, and the number of statements in the manipulation, as well as the range and the sustained duration of the induced mood.

5.2.1 Effects of Instructions and Content Types

How the instructions and statements employed in the VMIP influence self-reported mood and the consequent cognition and behaviour has been the area of controversy. As noted by Clark (1983), it is unlikely that the VMIP or Music Mood Induction Procedure (MMIP) will have a marked effect on mood unless subjects are instructed to work at moving towards a desired mood state. The notion here suggests that instructions alone may influence the outcome of the VMIP. Indeed, Slyker and McNally (1991) reported that instructions alone are as effective as the standard VMIP for producing anxious and depressed mood. Lenton and Martin (1991) examined the effect of instructions in the MMIP and showed that, in the absence of music, the instructions are both necessary and sufficient to produce a change in the dependent variables. At least some subjects can achieve mood changes when they are instructed to experience the target mood without the aid of listening to music or reading verbal statements.

However, other experiments have suggested that the types of statements employed in the VMIP may influence the effectiveness in producing mood change and subsequent measures of cognitive functions. The content of statements in the VMIP can be separated either by self-referent versus non-self-referent statements (Sherwood et al. 1981), or cognitive statements versus somatic statements (Frost et al., 1979). Frost et al. (1979) noted that about half of the Velten's statements in the depression manipulation can best be described as providing specific suggestions of somatic sensations such as fatigue and sleepiness (e.g. "I feel rather sluggish now"), and others concern self-devaluation such as low self-worth (e.g. "I am worthless"). Using regular depression induction procedures with these two types, the procedure with the somatic-reference statements resulted in greater self-reported depression than that with the self-devaluation ones. Similarly, Kirchenbaum et al. (1985) found that somatic-reference statements were more potent than self-devaluation ones, on both self-report mood measures and math problem-solving performance.

In contrast to the results above, these two manipulations have been said to induce comparably self-reported depression, but influence memory retrieval in different ways (Rholes et al., 1987; Riskind & Rholes, 1983; Riskind et al., 1982). The self-devaluation statements tended to influence a subject's recall of negative as opposed to positive personal memories, while the negative somatic statements did not. In other words, although similar mood was induced by both types of statements, only self-devaluation induction tended to increase the selective accessibility of schema-congruent personal memories.

Perhaps the most important issue emerging for the evaluation of the VMIP is the mechanism by which the VMIP might work and the ways in which it might influence subsequent cognitive functions and behaviours. The roles played by the VMIP's statements and instructions on subsequent mood change and memory accessibility have been the central focus of a debate between Clark (1983, 1985) and Riskind &

Rholes (1985a; 1985b). Although both agreed that the VMIP is effective in altering mood, Clark argued that the subsequent change of cognitive functions is "mood-dependent," while Riskind & Rholes proposed that it is a result of "cognitive priming." As noted by Clark, the VMIP statements may simply indicate to the subjects what kind of mood states the experimenter wants them to induce in themselves, and then they use a variety of strategies, which are separated from the contents of these statements, to induce the desired mood states. On the other hand, Riskind & Rholes argued that different contents of statements help to create different cognitive sets which can help to create particular mood states. Depending on the types of statements used, the cognitive contents embedded in these statements can then guide accessibility to specific types of memories.

From the available data, it is likely that both statements and instructions can alter mood because the VMIP is largely dependent upon subject compliance. But how the VMIP influences the relationship between subsequent change of mood and memory accessibility remains controversial.

5.2.2 Effects of Exposure time and the Number of Statements

Some studies employing the VMIP have shortened the number of statements and such short versions have been shown to be effective in producing desired mood states (Seibert & Ellis, 1991; Teasdale & Forgarty, 1979; Teasdale & Russell, 1983). In one study, Schare & Lisman (1984) divided a full set of 50 statements into two, which were then administered over two sessions. Subjects were assigned to one of three groups: reading the same set of either 25 or 50 statements, or reading different sets of 25 statements on both sessions. All subjects in these groups reported significant mood change, but those reading a full set of 50 statements reported to have undergone greater mood change. Unfortunately, it is unclear whether the results are caused by the number of statements or by the split method. As noted above, specific suggestion

from some statements may be more effective than other types of statements (Frost et al., 1979; Kirchenbaum et al., 1985). It is possible that statements contained in one 25-statement set are less effective for inducing mood than the other.

The standard read-out time for each statement used in Velten's study (1968) is 20 seconds, which has been amended across studies employing the VMIP. Teasdale and Russell (1983) instructed their subjects to read each statement at their own rate, spending roughly 20 seconds on each statement, but to spend longer on those which they found particularly effective and less time on those which they found less effective. Albersnagel (1988) reported a pilot study wherein the 20 seconds read-out time for each statement was used. The result showed this read-out time to be far too long, resulting in complaints of distraction and boredom. The author suggested that the read-out time could be limited to 12 seconds for each statement. However, results from the subsequent formal study showed that such procedure was less successful in inducing the desired mood.

The time spent on each statement has been found to correlate positively with depressive mood change as a result of the VMIP (Blackburn et al., 1990). Based on Cameron's study (1987), Blackburn et al. reported the advantages of using a microcomputer as the presentation medium. Each statement was shown on a microcomputer screen for a minimum of 30 seconds, after which the subject could move on by pressing any key on the keyboard. The time of the first key press for each statement was recorded by the microcomputer automatically, along with the number of time the keys were pressed. The findings indicated that the minimum time may have been too long, as their subjects first pressed the keyboard at an average time of 16 seconds, and often a high number of key press were recorded.

From these data, perhaps a better approach might be to shorten the minimum exposure time for each statement to about 15 seconds as suggested by Blackburn et al.

(1990), together with allowing subjects to read the statements at their own pace (Teasdale & Russell, 1983).

5.2.3 Range of Induced Mood States and Durability

The range of different moods for which the VMIP has so far been utilised is fairly restricted. Martin (1990) noted that the VMIP has been employed for inducing depressed, anxious, elated, and neutral mood but not for an angry mood. However, some have cast doubts on the validity of the VMIP studies concerning the discreteness of mood they purport to induce. Two studies suggest exceedingly high intercorrelations between depression, anxiety, and hostility in self-reported mood change as measured by the Multiple Affect Adjective Checklist when the VMIP was employed for the depressive mood induction (Cairns & Norton, 1988; Polivy, 1981 Experiment 2). This appears not a particular problem associated with the VMIP. Nowlis (1965) suggested that several mood components measured by his Mood Adjective Checklist could be changed together as a result of film mood induction procedures. Polivy (1981) suggested that this might be due either to the inability of participants to discriminate between various related affects, or to a tendency for moods in negative tone to occur together. However, she did find subtle individual differences in the degree of confounding for self-rated mood change, and suggested that there might exist a population of "good discriminators," who might be able to report discrete mood change in responding to the VMIP.

Several studies have suggested that the VMIP gives rise to moods which are short-lived, often only lasting a matter of minutes (Chartier & Ranieri, 1989; Frost & Green, 1982; Isen & Gorgoglione, 1983). Chartier & Ranieri (1989) compared the sustained duration of mood induced by the VMIP to the success-failure mood manipulation. Mood change was measured prior to, immediately after, and at five 6-minute intervals following exposure to both procedures. Both induction methods

were essentially equivalent in generating brief increases in positive mood, but the VMIP induced greater initial but more transient depressed mood than the failure manipulation. The induced positive and negative mood by the VMIP was sustained approximately 6 to 12 minutes, thereafter returning to the pre-induction mood level.

5.2.4 Summary

In the preceding sections, the procedural mechanism of the VMIP in inducing mood was reviewed. The present evidence suggests that the instructions and statements are useful to aid the subjects to get into the desired mood, while the number of statements appears to be a less important factor in accounting for the effectiveness of the VMIP. The exposure time for reading each statement as used in the original study of Velten has been shown to be unnecessarily long. It may be a better idea to use shorter minimum exposure times, together with allowing subjects to control their reading pace. The effect of the induced mood by the VMIP has been shown to be short-lived lasting no more than 12 minutes.

5.3 Criticism of the VMIP

The VMIP has been criticised, with alternative explanations being proposed to interpret the results. Because the procedure is transparent as to its purpose, concern has been expressed about differences in the self-reports or consequent behaviours of subjects being due to their motivation for compliance with what they perceive to be the experimenter's expectations or desires. Other charges against the procedure involve the success rate and the intensity of induced mood.

5.3.1 Demand Effects

More recently, the demand effects of the VMIP have received the greatest attention. To examine the demand effects, Velten (1968) himself employed two

demand conditions which were identical to the standard induction procedure for either elation or depression, having different instructions accompanying the demand groups. Subjects in the demand-elation condition were given instructions asking them to remember to act as if they were elated, with the demand-depression condition acting as depressed. Subjects in the demand conditions generally failed to report any change in mood or behavioural measures. However, Buchwald et al. (1981) attempted to replicate Velten's study and found a similar pattern of self-reported mood for these induction conditions, but failed to show significant differences on three behavioural measures across the conditions. They concluded that self-reported mood change may have been due to the demand effects and strongly opposed the use of the VMIP.

Polivy & Doyle (1980) noted that the use of only demand conditions does not provide an adequate test of whether demand characteristics produce mood-like behaviours. They introduced counter-demand conditions, wherein subjects are informed that people reading the statements tend to feel the mood opposed to that expressed in the set of statements, in an attempt to separate the demand effects from the supposed source of mood induction. It was hypothesised that if role demand is responsible for self-reported mood change found in the standard VMIP, using this technique, subjects would report mood change in the opposite direction. That is, subjects reading elation statements would act and report themselves as depressed and vice versa. Counter-demand subjects showed neither significant mood reversal nor induction effects. Rather, they tended to behave about the same as those given the neutral induction procedure. Nevertheless, subjects in the demand conditions presented the high and low extremes on several mood scales, which led the authors to conclude that the possibility of demand effects is likely.

Although the results from Buchwald et al. (1981) and Polivy & Doyle (1980) are often cited as evidence for demand effects in the VMIP, a considerable number of subjects receiving the standard induction procedure in these studies did report the

feeling implied by the statements during debriefing. Polivy & Doyle (1980) suggested that more than 50% of subjects in the standard and demand conditions reportedly "felt'" the induction mood. About one-third of subjects who received the counter-demand procedure reported that they felt the mood reflected by the content of the statements even though they have been instructed not to feel that way. Even in studies by opponents of the VMIP like Buchwald et al. (1981), 50% of subjects in the depressive condition and 75% in the elation condition reported to have mood change as a result of the induction procedure. As noted above, the instructions and the statements may both contribute to the effectiveness of the VMIP in producing mood change. Simply asking subjects to pretend to feel a certain way, as do instructions used in the demand conditions, may cause them to use various strategies to aid their affective states as suggested. In this case, it appears impossible to distinguish how much of the observed induction is "real" and how much is "merely" demand responses.

The role-demand hypothesis can be questioned on the ground of the obtained change in several behavioural measures which subjects are unlikely to simulate. As already discussed in Chapter 2, it has often been found that psychomotor tasks reveal a decrease in speed associated with induced depression and an increase in speed when the elated VMIP is employed. Another evidence against the role-demand hypothesis is provided by experiments concerning the relationship between mood and memory (see Martin, 1990). In the memory tasks employed by these experiments, subjects are often asked to respond as fast or to recall as much as possible. In this case, the role-demand hypothesis provides no convincing explanation as to why the time taken to retrieve pleasant memories in response to a prompt, relative to the time taken to retrieve unpleasant memories, is significantly longer for subjects who are given the VMIP-depression than those receiving the elation induction (Teasdale & Forgarty, 1979); and why should a higher ratio of negative to positive material be recalled in

addition, Snyder & White (1982) reported that the induced depression leads to a selective memory for negative information, but the demand-depression induction did not.

5.3.2 Success Rate

The VMIP has been claimed to be ineffective due to the large percentage of subjects who fail to respond to it (see Clark, 1983). However, such modest success rates also apply to many other mood-induction procedures, including social feedback and social recollection (Riskind & Rholes, 1985a; Martin, 1990). The MMIP has been said to have a higher success rate than the VMIP. In comparison with the VMIP, Sutherland et al. (1982) suggested that the MMIP resulted in larger changes in depressive mood, and was not so wasteful of subjects as the VMIP has been shown to be. However, recent research comparing both manipulations found no significant differences in the effectiveness of inducing mood (Albersnagel, 1988; Lenton & Martin, 1991).

The criticism is difficult to verify because there is no single agreed standard for inferring that a mood has been successfully induced in an individual experimental subject. Nevertheless, the variety of success rates across mood induction procedures imply that there may be individual differences in susceptibility to a particular induction procedure. This will be discussed in turn.

5.4 Individual Differences in Susceptibility to the VMIP

Systematic variations among people in their responsiveness to the VMIP have been investigated, mostly based on cognitive (e.g. Beck, 1976) and social theories (e.g. Carver & Scheier, 1990) of depression and from the psychology of individual differences (Eysenck & Eysenck, 1985). The factors which have been investigated

include gender, personality traits such as neuroticism and extroversion, and a participant's current concerns, basal mood states, and beliefs in the statements.

Due to the very large majority of studies using the VMIP limiting themselves to female subjects, it has been speculated that the VMIP might be ineffective when used on male subjects (see Morris, 1989). Female subjects have been reported to be more susceptible than males to the effects of the VMIP (Albersnagel, 1988; Gouaux & Gouaux, 1971). However, recent research has attempted to amend such bias for subject selection and the results do not provide much further support for such speculation (Blackburn et al., 1990; Polivy, 1981; see Clark, 1983; Martin, 1990 for reviews).

Studies of the relationship between personality and mood usually hold that the broad personality types, traits, or dispositions act somehow as parameters, or boundaries, of the more limited mood dispositions (Wessman & Ricks, 1966). Personality traits that have commonly been associated with mood responding are Eysenck's three dimensional typology of extroversion, neuroticism, and psychoticism (Eysenck & Eysenck, 1985). The extroversion trait has been shown to predispose individuals towards positive affect, whereas the neuroticism trait predisposes individuals towards negative affect (Costa & McCrae, 1980). Consistent with this notion, Blackburn et al. (1990) reported that the neuroticism trait, but not the extroversion trait, correlated positively with the reactivity to the VMIP-depression.

Another personality traits involves dispositional self-awareness. Evidence that self-awareness influences subjective reactiveness to the VMIP is provided in studies by Scheier and Carver (1977; Carver & Scheier, 1978). They found that greater mood change was reported by the reading of Velten's negative self-referent statements in participants for whom self-awareness was increased by the presence of a mirror, and also for those scoring high in the private self-consciousness scale (Fenigstein et al., 1975). A similar result has been reported by Goodwin & Williams (1982), wherein

subjects were more affected by reading a series of depression self-statements if they scored highly on the private self-consciousness scale.

Contrary to what might have been predicted from the research literature cited above, Albersnagel (1988) reported that neither the private self-consciousness nor neuroticism and extroversion traits played an important role in influencing the VMIP's effectiveness. Nevertheless, the VMIP employed in this study was ineffective as manifested by self-reported and behavioural measures. The low correlation between personality traits and mood responding might partially due to the ineffectiveness of the VMIP.

Personality trait of "locus of control," as measured by the Internal-External of Locus Control Scale (Rotter, 1966) has been investigated to test the hypothesis that subjects with an internal locus might be more resistive to the VMIP manipulation, while those with an external locus control would be less resistive. However, two studies failed to find any significant relationship between the locus of control and a subject's responsiveness to the VMIP (Cairns & Norton, 1988; Lewis & Harder, 1988).

An individual may be more susceptible to the VMIP if the contents of statements are congruent with their current thoughts or mood experiences. Blackburn et al. (1990) supported the notion that a respondent's basal levels of depression and frequency of negative thoughts are associated with the reactivity to the VMIP-depression manipulation. But other studies (Cairns & Norton, 1988; Lewis & Harder, 1988) failed to support the relationship between the subjective basal mood levels and mood inducibility.

The congruency between current concerns and the contents of statements may enhance a subject's beliefs about the statements, which in turn influence the effectiveness of these statements. Blackburn et al. (1990) found that subjects' degrees of beliefs in the statements increase their susceptibility to the VMIP. Cairns & Norton

(1988) reported their informal observation that several subjects quietly said "No" to themselves or shook their heads while they were reading some statements. These subjects who negated the mood statements may be similar to the "rational" subjects of Cash et al. (1986), in which persons scoring low on a Irrational Beliefs Test were more susceptible to positive mood manipulation, while high scorers were more susceptible to negative manipulation. These findings point to that subjects are less susceptible to the VMIP if the statements do not correspond to their beliefs or current concerns.

In sum, results from studies which employed these measures of personality traits and the VMIP are somewhat consistent with the personality and clinical literature. Individual differences of extroversion, neuroticism, and dispositional self-awareness are likely to contribute significant variations for the VMIP's effectiveness. The reciprocal relationship between the VMIP's inducibility and a subject's current concerns and beliefs in the statements may be understood in the context of an associative network theory of memory (Bower, 1981). Depressed mood may facilitate the focusing on depressed thoughts and such negative thoughts in turn increase depressed mood.

5.5 Conclusion

Methodological issues concerning the use of the VMIP for mood induction has been assessed in this chapter. The instructions, types of statements, and exposure time to each statement appear to affect the variety and intensity of induced mood. The VMIP is especially desirable for the practice of minimising ethical concerns because its purpose remains transparent to the subjects, as well as the fact that mood change resulting from this procedure appear to be short-lived. Being obviously dependent upon participant compliance, the effectiveness of the VMIP to shift mood has been shown to associate with individual differences of personality extroversion and

neuroticism traits, dispositional self-awareness, personal current concerns, and an individual's beliefs in statements which are used.

It may appear improbable that any significant mood shift could occur by using such a technique as the VMIP that so obviously rely on participant compliance in achieving its effect. It has been considered that the VMIP produces self-reported mood shift merely through the demand characteristics of the instructions. Several studies devoted to the investigation of the demand effects have been unsuccessful because of the similarity between the standard Velten procedure and the demand condition. The role-demand hypothesis is less probable due to the evidence that the VMIP has been demonstrated to affect not only self-reported mood, but also psychomotor activities and memory tasks which subjects are unlikely to be able to simulate.

The VMIP appears to provide a good analogue of mild and naturally occurring mood change. Although its use in studying the relationship between mood and cognitive functions remains controversial, the VMIP has a clear use to enable the experimenter in a laboratory setting to examine in greater detail the self-reporting processes of mood change. As already shown in Chapter 3, self-ratings of mood change across the menstrual cycle are influenced by the measurement artefacts. The employment of the VMIP can therefore enable the experimenter to control or identify the source of confounding variables which influence the non-equivalence of computer and paper-&-pencil assessment of mood change or experience.

CHAPTER 6
THE RELATIONSHIP BETWEEN COMPUTER ANXIETY AND COMPUTERISED MOOD ASSESSMENT

6.1 Introduction

The results presented in Chapter 3 raise questions concerning the equivalence of CBT and P&P mood assessment. The heightened negative mood in CBT may indicate that there are sources of variance that typically go unnoticed. As affective reactions within a testing context are often found to interfere with the flow of the self-reporting processes (see Messick, 1985 for a review), the between-modality nonequivalence results may reflect subjects' emotional involvement within the HCI.

As reporting processes are often influenced by situational stimuli which have strong effects upon the direction of attention, it has been proposed in Chapter 1 that CBT may exercise its control over such processes in terms of increasing either "arousal" or "self-focused attention." With respect to the arousal construct, the computer may serve as a stressful stimulus to elevate state anxiety in comparison with conventional test procedures. (George et al., 1992; Hedl et al., 1973; Lewis et al., 1988). Computer anxious people when interacting with computers have been often reported to experience physiological arousal such as increased blood pressure and heart rate (Powers, 1973). Studies have also consistently reported that nearly one-quarter to one-third of the population can be characterised as suffering from computer anxiety or computer phobia, showing a strong negative affective reaction towards computer use (see Brosnan & Davidson, 1994 for a review). In addition, self-rating severity of depression in CBT has been shown to vary as a function of the measure of "computer anxiety," indicating that the CBT administration may not yield equivalent results when administered to a computer anxious individual (George et al., 1992).

Viewed in this light, CBT administration may influence computer anxious people to report heighten negative mood through increments in emotional arousal. It is plausible, therefore, to ask how the interaction between individual differences of computer anxiety and the CBT administration would influence the self-reporting processes of mood change.

The current study presents an attempt to investigate whether the subjective degree of computer anxiety influences the between-modality equivalence of self-reported mood change. Elation Mood change is experimentally manipulated by a modified Velten Mood Induction Procedure (VMIP) using a computer as the presentation medium. The VMIP has been widely and successfully used in the laboratory to produce either elation, depression or neutral mood (see Chapter 5). Several cognitive tasks, i.e. the counting speed task, forward digit span, and word recall task, were employed as a validation of self-report measurement of mood change in response to the VMIP. They have been found to be sensitive to the occurrence of mood change. As suggested in Chapter 2, a decrease in counting speed occurs when subjects are induced towards a depressed mood and an increase in counting speed when they are induced towards an elated mood. The digit span task has been employed to examine the effect of anxiety on performance of the working memory system (Eysenck, 1982). In spite of some inconsistencies, it is primarily under conditions of high state anxiety or stress that there are adverse effects on digit span performance. Regarding the word recall task, the differential effects of induced mood states on memory have attracted considerable attention in the literature, especially concerning mood-congruency effects (see Blaney, 1986; Ellis & Ashbrook, 1991 for reviews). The effects suggest that individuals are believed to encode and/or retrieve affectively-valenced information in a way which is consistent, or congruent, with their prevailing mood state more easily than do they for material which is incongruent with the mood (Blaney, 1986). It has been consistently reported that significantly more

positive-trait words than negative-trait words are recalled when elated mood is experimentally induced (Isen et al., 1978; Teasdale & Russell, 1983).

The present study is designed to examine the relationship between individual differences in computer anxiety and the equivalence of CBT and P&P mood assessment in response to a modified VMIP. The efficacy of the VMIP is assessed by both self-report and cognitive performance measurement. It is hypothesised that self-reports of mood obtained in the CBT format will covary with the subjective degree of computer anxiety, which may in turn produce non-equivalent self-reports of mood change between the CBT and P&P administration.

6.2 Methods

6.2.1 Design of the Study

There were three conditions. Two of which, namely the CBT and P&P condition, differed only in the version of mood assessment given to subjects pre- and post-VMIP, either in the CBT or P&P format. Participants in these two conditions completed the computerised cognitive tasks, the computer-administered VMIP, and the P&P versions of the Computer Anxiety Rating Scale (CARS, Heinssen et al., 1987) and Self-Consciousness Scale (SCS; Fenigstein et al., 1975).

As both conditions involved computer tasks, subjects in the P&P condition had the knowledge and expectation that they would be required to work with computers after completing P&P-administered mood assessment. Such knowledge or expectation may introduce the confounding factor for differentiating the relationship between computer anxiety and affective ratings measured by CBT from those completed in the P&P format. A Control-P&P condition, in which participants received the mood scales and CARS administered in the P&P format but without the

presence of a computer during the assessment session, was included to eliminate the possible effects brought about by such a confounding factor.

6.2.2 Subjects

All were volunteer students attending practical classes and tutorials in the Psychology Department, the University of Edinburgh. 32 females and 22 males were assigned to the CBT condition; 36 females and 18 males to the P&P condition; 31 females and 18 males were allocated to the Control-P&P condition. The age range was between 16 and 25 years.

6.2.3 Measurements

6.2.3.1 Questionnaires

The questionnaires employed in this study included the Visual Analogue Mood Scales, a Linguistic Implications Form, a Computer Anxiety Rating Scale, and a Self-Consciousness Scale. Both the Linguistic Implications Form and Self-Consciousness Scale are employed as measures of either momentary or dispositional self-focused attention. The details and results of the two measures will be discussed in Chapter 7. The characteristics of the remaining questionnaires are described as follows (examples of these measures are presented in Appendix I):

Visual Analogue Mood Scales (VAMS). The VAMS consist of 8 items, most were drawn from the VAS included in Chapter 3 which contributed to the principal component factor concerned with mood states. By altering the order of items in the original VAMS, an alternative form was devised for measuring mood states after the mood induction procedure. Both forms of VAMS each has a computerised version.

Computer Anxiety Rating Scale (CARS). The CARS was developed by Heinssen and his colleague (1987) to assess the relative level of computer anxiety in

individuals. It consists of 19 Likert-type items in which 9 were positively and 10 negatively worded towards computer use. The CARS has been reported to have high internal consistency (Cronbach alpha = .87), was reliable (r= .70, p < .0001) and stable over a test-retest interval of four weeks (Heinssen et al., 1987).

6.2.3.2 Cognitive Tasks

Three cognitive tasks were included in the present study, which assessed different levels of cognitive functions such as memory, information processing, and attention. All the tasks were administered in the CBT format (The instructions and materials for each cognitive task are presented in Appendix I).

Counting Speed Task. The task consisted of a table of letters in which 10 targeted letters were embedded amongst other irrelevant letters. Participants were asked to count how many targeted letters were in the table and then type the answer by using the keyboard. The answer and the response time were then recorded.

Forward Digit Span Task. A computerised forward digit span task was devised. A series of digit numbers ranging from 3 to 9 digits were presented on a computer monitor at the rate of one digit per second (Anderson & Burns, 1973). Subjects were instructed to memorise the series of digits and recall them immediately after presentation.

Memory Task. The material and procedure of this memory task was adopted from Teasdale and Russell (1983). The list consisted of 36 words, half were rated as personality trait words, and half neutral non-trait words. Among the 18 personality trait words, one third of the words have been rated as being the most-liked, neutral, and least-liked. Each word in the list was presented on the monitor for 1.6 seconds. None of the list-words appeared in any statements of the VMIP or the VAMS. It has been reported that more positive trait words are recalled following an elated mood

induction procedure (Isen et al., 1978; Teasdale & Russell, 1983). The list of words and their personality trait attributes is presented in Table 6.1.

6.2.4 Modified Velten Mood Induction Procedure

A modified VMIP was developed to be run on a Macintosh computer. The procedure consisted of the presentation of 25 self-referent statements, developed by Seibert and Ellis (1991), all positive in affective tone. Seibert and Ellis (1991) reported that the standard mood induction procedure is effective in inducing elation mood change and has shown itself to be useful in laboratory research when investigating the effects of mood states on memory and other cognitive processes.

The importance of full involvement in this part of the procedure was stressed by giving subjects instructions, such that while reading through the statements they should try to get into the state suggested by the statements, that was, to experience for

Table 6.1 The List of Words Used in the Memory Task

Non-Trait Words		Personality-Trait Words		
		Neutral	Positive	Negative
novel	bear	bold	helpful	hostile
television	apricot	unconventional	pleasant	mean
sword	trailer	cautious	thoughtful	ungrateful
chisel	vanilla	shy	kind	cruel
rock	jacket	excitable	sincere	impolite
brick	carbon	proud	considerate	rude
eagle	game			
petunia	zinc			
grasshopper	engineer			

Note. The order of presentation was as follows:
novel, bear, television, apricot, sword, trailer, helpful, bold, hostile, chisel, unconventional, mean, vanilla, pleasant, ungrateful, rock, thoughtful, cautious, jacket, kind, shy, cruel, sincere, excitable, impolite, brick, proud, rude, carbon, considerate, eagle, game, petunia, zinc, grasshopper, engineer.

themselves the mood described (examples of the statements and instructions are presented in Appendix II). With instructions to "read each statement carefully and to try to feel the mood suggested," each statement was shown on the screen for a minimum of 15 seconds after which the subject moved-on, if he/she wished, by pressing the mouse button. The design enabled subjects to move at a self-selected pace (see Chapter 5).

Using a computer as the presentation medium for the VMIP has been found to be as successful as the standard presentation of the VMIP for the induction of depressive mood states (Blackburn et al., 1990). This computerised VMIP has been shown equally effective in inducing change of elation mood in a pilot study run by this author, which recruited 14 volunteer female students. Given this computerised VMIP, most of the subjects self-reported experiencing significant elation mood change.

6.2.5 Procedures

The study was conducted in the Departmental practical class teaching microlab, consisting of several cubicles. Each cubicle was equipped with a Macintosh Colour Classic, together with a keyboard and a computer mouse. There was a spare table for filling P&P questionnaires besides the computer.

Figure 6.1 shows a flow chart of the procedures for both experimental conditions. At the beginning, all subjects read instructions outlining the procedures (examples of the instructions for each condition can be seen in Appendix II) and stressed the purpose of the study to be investigation of the relationship between mood and memory function. In order to keep the records confidential, each subject was assigned an ID number and he/she was asked to print it on all the questionnaires. They were also informed that they could ask for help from the experimenter if any problems occurred and were free to withdraw from the experiment at any point. None of them withdrew from the experiment.

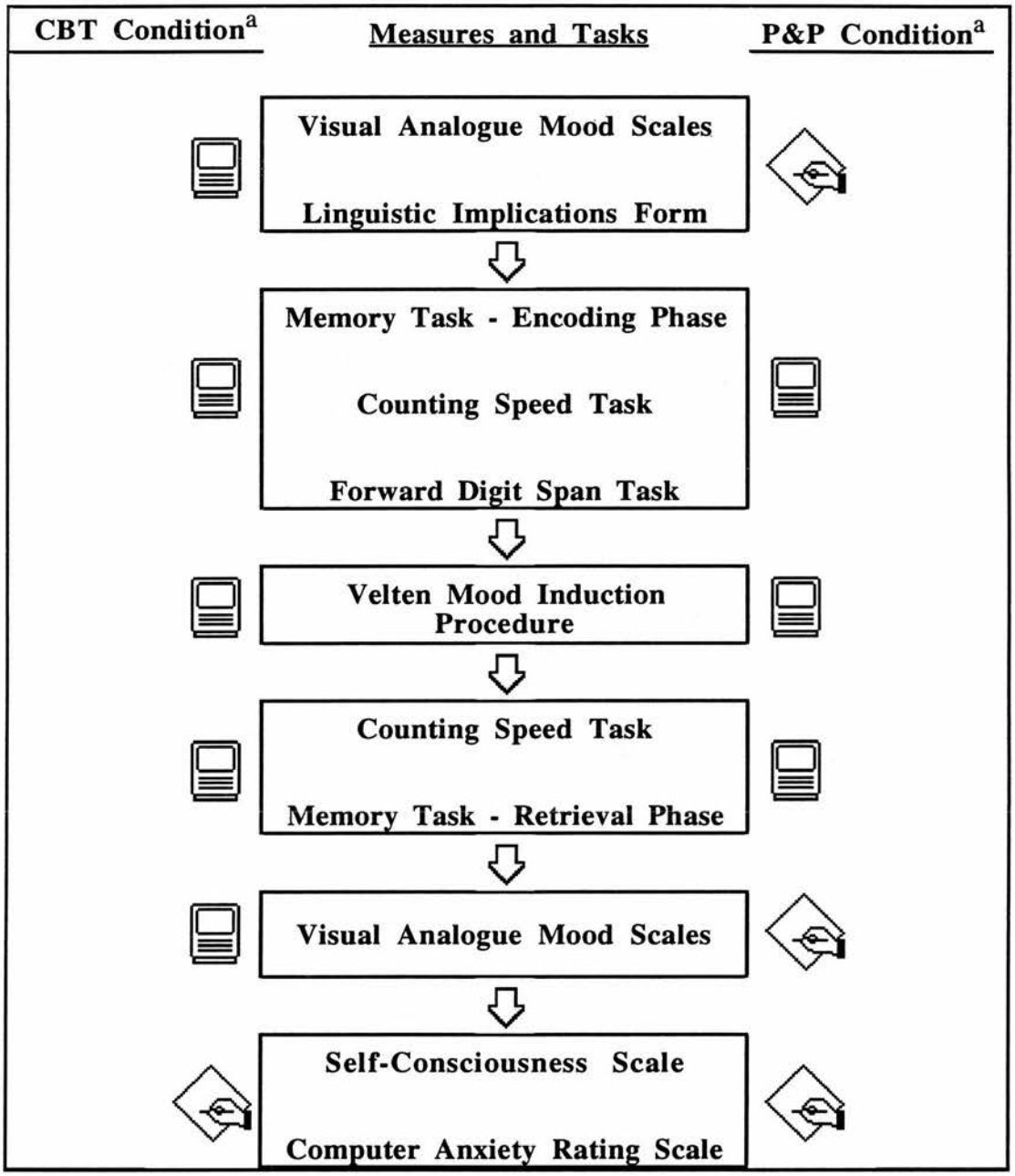

Figure 6.1 Flow Chart of the Procedure. The icons indicated the test modes of each measurement or task for each condition. [a] N=54 for each condition.

Most of the procedures were pre-programmed such that subjects could work in isolation and privacy. Subjects were randomly allocated to each condition, and completed either the CBT or P&P versions of the VAMS and Linguistic Implications Form. Those in the P&P condition were told to give the questionnaires to the

experimenter following their completion. Participants in the CBT condition carried out the tests as administered by the computer programmed sequence of screen presentation.

Next, all participants were presented on the monitor with the list of words of the memory task, accomplished by instructing subjects to memorise the words which they would subsequently be asked to recall. Immediately thereafter were the first counting speed task and the forward digit span task. They then engaged in the computerised mood induction procedure. After reading through the statements, all the participants received the second counting speed task. Afterwards they were instructed to recall as many words as they could remember from the list they read prior to the mood induction procedure. They were allowed two minutes for this procedure.

On completion of the memory task, subjects received either the CBT or P&P version of the VAMS according to their assigned conditions. Finally, all the subjects were asked to fill the P&P versions of the CARS and SCS. Upon completion of the experiment, they were thanked for their help, and assured of their response confidentiality.

In the Control-P&P condition, participants received both the VAMS and the CARS administered in the P&P format. They were tested in groups of 5 to 10, when they attended their tutorials. The average elapsed time for completing these scales was about 10 minutes.

6.2.6 Data Analysis

As most of the VAMS are highly correlated (see Chapter 3), three summary variables were derived by linear combination of the individual variables in the VAMS. The summary score of "Positive Mood" was derived by linear combination of three mood variables with positive valence (i.e. happiness, activation, and sociability) and "Negative Mood" for the remaining four moods with negative valence (i.e.

depression, anxiety, irritability, and fatigue). Finally, a summary score of "Elation" was derived as being the average of subtracted score of "Negative Mood" from "Positive Mood."

6.3 Results

6.3.1 Efficacy of the VMIP

The computerised VMIP was shown to be effective in influencing measures of self-reports and cognitive performances. The analyses revealed that the computerised VMIP successfully induces elated mood states, increases counting speed, and enhances the selective accessibility of mood-congruent memories. Furthermore, self-reports of mood change as a result of the procedure are significantly different between the administration modalities of mood assessment.

6.3.1.1 Effects of the VMIP and Administration Modality on Affective Ratings

The hypothesis that self-ratings of mood change are influenced by the mood induction procedure and the testing modalities was examined by a 2 (Within-subjects: Pre- and Post-VMIP) X 2 (Between-subjects: CBT versus P&P) factorial ANOVA. Means scores of affective ratings by conditions are presented in Table 6.2.

Elated mood was successfully induced with the computerised VMIP. A significant main effect of the VMIP was found on the affective ratings of the summary score of Elation (F= 6.64, d.f. = 1, 106, $p < .01$), showing significant increases with particular mood states such as "happiness" (F= 18.47, d.f. = 1, 106, $p < .0001$), "activation" (F= 14.26, d.f. = 1, 106, $p < .0001$) and significant mean decreases in affective ratings of "fatigue" (F= 4.08, d.f. = 1, 106, $p < .05$) and "anxiety" (F= 8.01, d.f. = 1, 106, $p < .005$).

Table 6.2 Affective Ratings as a Function of the VMIP and Test Mode

Mood Scores	VMIP Modes	PRE- Mean (SD)	POST- Mean (SD)	F test[a]
Happiness	CBT	52.22 (20.8)	58.76 (20.0)	VMIP ****
	P&P	52.91 (19.8)	61.94 (16.2)	
Activation	CBT	38.46 (24.2)	45.50 (20.3)	VMIP ****
	P&P	35.07 (22.2)	42.18 (20.2)	
Sociability	CBT	62.35 (24.1)	60.85 (20.4)	
	P&P	56.59 (20.6)	58.46 (19.4)	
Irritability	CBT	38.89 (27.0)	41.06 (25.4)	Interaction *
	P&P	33.11 (24.2)	25.38 (20.0)	
Depression	CBT	33.83 (26.3)	32.65 (25.8)	MODE *
	P&P	25.76 (20.0)	24.07 (18.2)	
Fatigue	CBT	57.70 (28.4)	58.11 (25.2)	VMIP *; MODE *
	P&P	59.78 (26.6)	50.93 (25.8)	Interaction *
Anxiety	CBT	37.43 (25.7)	34.52 (23.1)	VMIP **
	P&P	36.72 (23.4)	27.72 (18.4)	
Summary Scores				
Positive Mood	CBT	51.01 (19.8)	55.04 (17.8)	VMIP ****
	P&P	48.19 (17.3)	54.20 (15.4)	
Negative Mood	CBT	41.96 (21.8)	41.58 (19.7)	VMIP **
	P&P	38.84 (17.8)	32.03 (15.6)	Interaction *
Elation	CBT	4.52 (19.3)	6.73 (17.6)	VMIP **
	P&P	4.67 (15.6)	11.08 (13.9)	Interaction *

[a] Two way ANOVA: VMIP represents Main Effect of the VMIP; MODE: Main Effect of CBT versus P&P Administration; Interaction: Interaction Effect between the VMIP and Testing Mode.

Significance Levels: * $p < .05$ ** $p < .01$ *** $p < .001$ **** $p < .0001$

In examining affective ratings as a function of testing modes, the results were consistent with previous observation, revealing that subjects reported heightened negative mood such as "depression" (F= 4.25, d.f. = 1, 106, $p < .05$) and "fatigue" (F= 6.6, d.f. = 1, 106, $p < .05$) via the CBT administration.

Effects due to the interaction between the administration modality and the VMIP were significant on the summary variable of "elation" (F= 5.32, d.f. = 1, 106, $p <$ .05) and "negative mood" (F= 6.64, d.f. = 1, 106, $p < .01$), especially on individual mood state of "fatigue" (F= 4.9, d.f. = 1, 106, $p < .05$) and "irritability" (F= 5.45,

d.f. = 1, 106, $p < .05$). Inspection of the mean scores in Table 6.2 suggested that subjects reported greater mood improvements with P&P assessment than did those tested with CBT, especially on self-reports concerning the reduction of negative mood. The between-modality differences in self-reports of negative mood administered immediately after the VMIP (2-tailed $t = 2.79$, d.f. = 106, $p < .01$), suggested that the consequence of the VMIP manipulation was more morbid in P&P than in CBT mood assessment (see Figure 6.2).

6.3.1.2 Effect of the VMIP on Counting Speed

The significant mean differences between the pre-VMIP (M=14.67 sec, SD=4.97) and post-VMIP (M=11.65 sec, SD= 3.95) counting speed task, suggested that counting speed was increased with the computerised VMIP (two tailed $t = 7.6$, d.f. = 107, $p < .0001$). Figure 6.3 presents the effect of the VMIP on the performance of counting speed tasks.

This result may be criticised as a function of practice effects. However, a correlational analysis of the relationship between counting performance and self-ratings of mood cahnge makes the criticism unlikely. The counting speed improved correspondingly with the reduction of negative mood revealed in the P&P format (*Pearson r (52)* = 0.34, $p < .01$) , but no significant correlation was found with those measured in CBT (*Pearson r (52)* = 0.12, *n.s.*).

6.3.1.3 Mood-Congruent Memory

The hypothesis of mood-congruent memory was tested through the comparison of recall between positive and negative personality-trait words. No significant effects of the VMIP on recall of positive versus negative personality-trait words were found (*one-tailed* $t = .67$, d.f. = 107, *n.s.*). The mean number of words recalled in each category is presented in Table 6.3

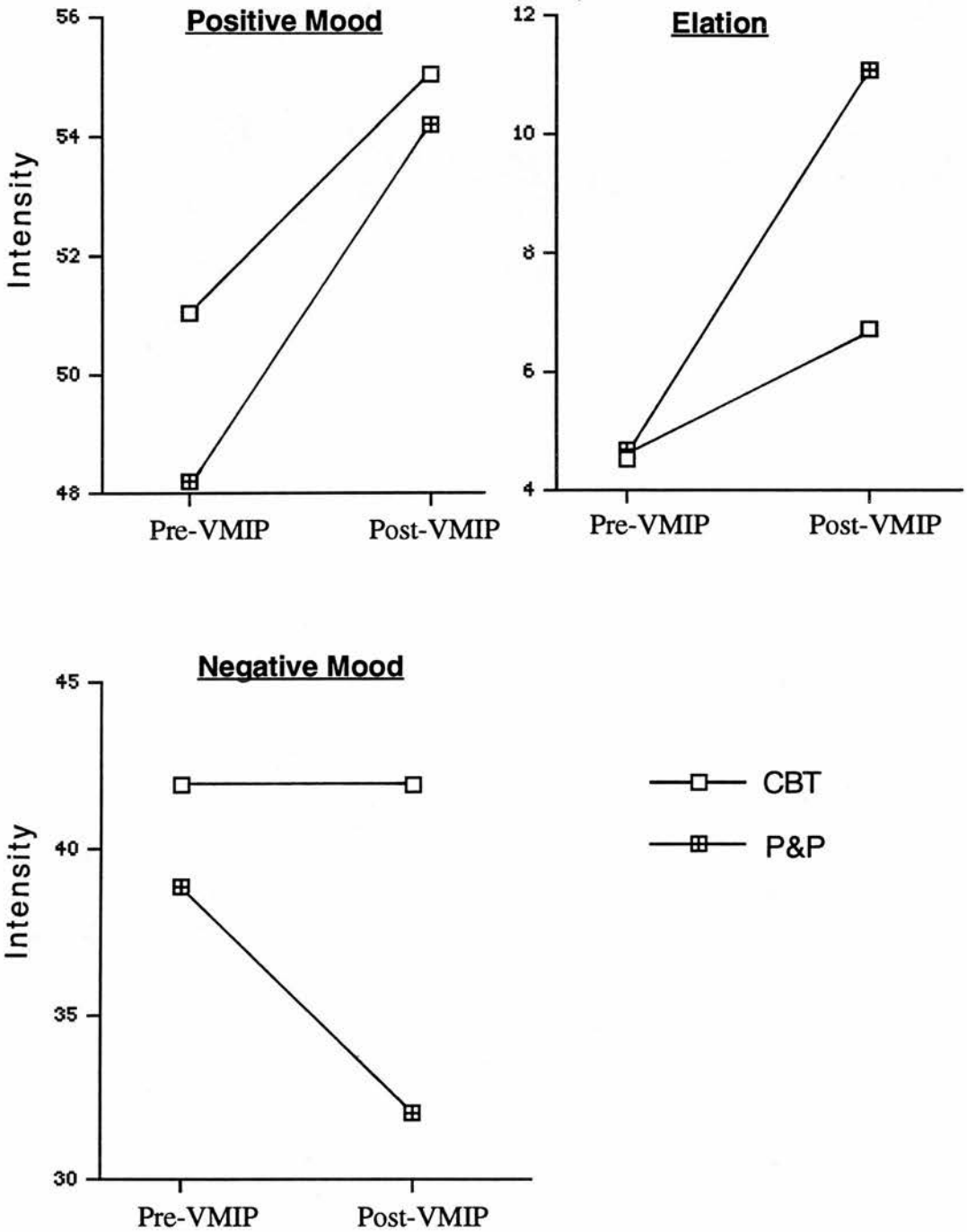

Figure 6.2 Affective Ratings of Mood Change as a Function of the VMIP and Administration Modality.

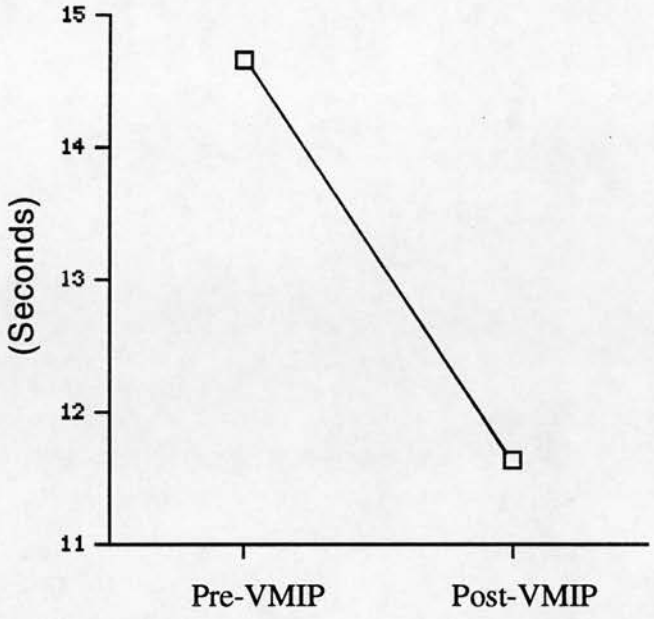

Figure 6.3 Improved Performance of Counting Speed as a Function of the VMIP. Significant difference at the $p < .0001$ according to the two-tailed t test.

Table 6.3 Mean Number of Words Recalled for each Category by Gender

Trait Words Gender	Positive Mean (SD)	Negative Mean (SD)	Neutral Mean (SD)
Female	0.73 (0.87)	0.77 (0.71)	0.69 (0.77)
Male	0.30 (0.51)	0.38 (0.53)	0.56 (0.63)
Total	0.57 (0.78)	0.63 (0.74)	0.64 (0.72)

Note. Number of subjects: N = 108, Female=68 and Male=40.

However, the correlational analysis revealed that the retrieved number of positive-trait words correlated significantly with affective ratings of "Elation" (*Pearson r (106)* = .20, $p < .05$) and "Negative Mood" (*Pearson r (106)* = -.28, $p <$ .005). It is thus possible that the effect of VMIP on memory might be more clearly manifested if subjects experienced mood changes strongly and, more so for female subjects (Clark & Teasdale, 1985, Study 1). Subjects who were rated with increase in

elation on the top one-third (30 females and 13 males) were selected for an analysis of mood congruent memory. These selected subjects reported increases in the summary "elation" score at the intensity of 8.5 or above.

As presented in Table 6.4, the differences in the retention number of positive and negative-trait words for the 43 subjects showed the trend of mood congruent effect (*one-tailed* $t = 1.42$, d.f. = 42, $p < .1$). The effect was more significant for female subjects (*one-tailed* $t = 1.71$, d.f. = 29, $p < .05$), but no such effect could be seen in the case of the male subjects (*one-tailed* $t = 0.56$, d.f. = 12, *n.s.*). The results indicate that significant mood congruency effects in recall are mediated by gender and the quantity of increased mood in response to the VMIP.

6.3.2 Computer Anxiety and Affective Ratings

The hypothesis that affective ratings are influenced by the interaction between individual differences in computer anxiety and testing modalities was tested by using data obtained from the three conditions, i.e. the CBT, P&P, and Control-P&P condition. In comparison with male subjects, female participants reported significantly higher degree of computer anxiety (*two tailed* $t = 5.0$, d.f. = 155, $p < .0001$). Self-ratings of computer anxiety level were found to correlate negatively with the frequency of computer use with a high level of significance (*Pearson* $r\ (155) = -0.58$, $p < .0001$).

Pearson product-moment correlation analyses were conducted in order to

Table 6.4 Mean Number of Words Recalled for Subjects with High Degree of Elation Mood Change

Trait Words / Gender	Positive Traits Mean (SD)	Negative Traits Mean (SD)	*t* test one-tailed
Female	1.09 (0.96)	0.67 (0.80)	<.05
Male	0.31 (0.48)	0.38 (0.51)	n.s.
Total	0.85 (0.92)	0.67 (0.74)	<.1

Note. Number of subjects: N = 43, Female=30 and Male=13.

determine the relationship between computer anxiety and affective ratings for each condition. Subjects' computer anxiety scores were correlated with their summary mood scores of the VAMS administered prior to the VMIP. The correlation coefficients are presented in Table 6.5.

According to comparisons of independent correlation coefficients (Rosenthal & Rosnow, 1991), significant differences were found in the correlations of computer anxiety and affective ratings administered by CBT compared to the P&P format. Computer anxiety scores significantly correlated with self-reported mood in CBT, but not with those tested with the P&P version. When measured by the CBT format, self-reports of negative mood increased proportionately (r (52) = .50, p < .0001) and the converse for those of positive mood (r (52) = -.49, p < .0001) as the levels of computer anxiety raised. No relationship existed between the measure of computer anxiety and affective ratings tested with the P&P format. Figure 6.4 shows the correlations of computer anxiety with mood scores obtained from the two administration modalities.

The same analysis was applied to mood assessment administered after the VMIP. The correlation coefficients are presented in Table 6.6. A similar trend for correlations was found, indicating that scores from the measure of computer anxiety correlate divergently with the CBT- and P&P-administered mood scores. The smaller correlation coefficients between computer anxiety and affective ratings may result from self-reports of mood being influenced by the mood induction procedure.

Table 6.5 Correlations between Computer Anxiety and Affective Ratings prior to the VMIP for each Condition

Test Modes / Mood Scores	CBT	P&P		Diff.
		Experimental	Control	
Positive Mood	-0.49***	-0.07	0.01	<.01
Negative Mood	0.50***	0.22	0.16	<.05
Elation	-0.53***	-0.18	-0.10	<.01

Significance level: *** < .0001

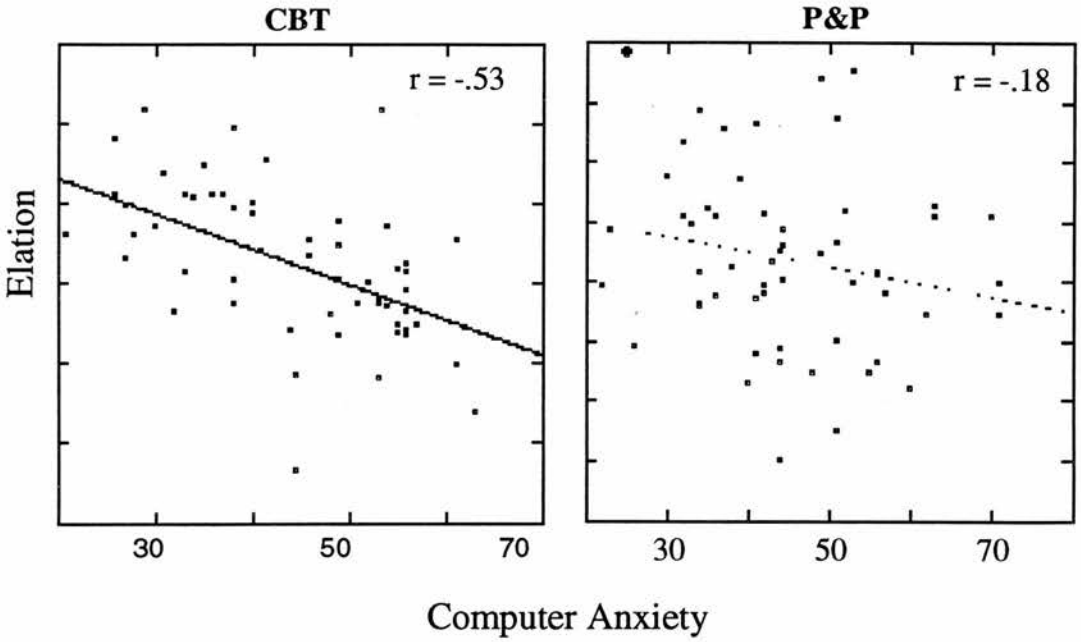

Figure 6.4 Correlation between Computer Anxiety and Self-reports of "Elation" Mood by Administration Modes.

Table 6.6 Correlations between Computer Anxiety and Affective Ratings Administered after the VMIP for each Modality

Test Modes Mood Scores	CBT	P&P
Positive Mood	-.32*	-.14
Negative Mood	.38**	.18
Elation	-.38**	-.18

Significance Level: * <.05 ** <.005

6.4 Discussion

Elated mood was successfully achieved with the computerised presentation of the VMIP as manifested from both the self-reported and cognitive measurements of mood change. The computerised VMIP appears to be powerful enough to produce elation mood in a similar proportion of subjects to that observed in previous studies in inducing depressive mood (Blackburn et al., 1990). The presentation of the VMIP via

a computer console provides an appropriate method, for incorporation into a more extended study of subjects' control and privacy whilst simultaneously reading the statements.

With respect to the mood-congruent effects, it is instructive to compare the current results with those of Isen et al. (1978), Clark & Teasdale (1985), and Teasdale & Russell (1983), who used the same set of trait words. The present results, and those reported by Isen et al (1978) and Teasdale & Russell (1983) found relatively low overall recall of words (approximately 15% recall in the present study). This is most likely related to the rapid single presentation of the word list used in these studies.

Consistent with Clark & Teasdale (1985), the mood congruent effect is only manifested in female subjects. Although Isen et al. (1978) and Teasdale & Russell (1983) did not consider the gender effect as a variable, it is possible that the mood-congruent effects noted therein may reflect the behaviour of female subjects only. For example, the mood-congruent effects reach borderline significance for the mixed gender sample in the present study which turn out to represent the effect as much more manifest in female than male subjects.

The gender differences in mood-congruent recall may represent the importance of self-reference concerning the retrieved materials. In their second study designed to explain the results of gender differences, Clark & Teasdale (1985) discovered that females in their study used these personality-trait words more frequently in their daily life than the males. The previous experiences with the retrieved material may mediate the relationship between mood and memory accessibility. The memory task parameters involved in the mood-congruent effect are thus likely to depend on factors such as self-reference of these materials. Indeed, there is evidence to suggest that induced mood states have more impact on memory for materials that are processed as relevant to the self than for those that are impersonally processed (see Blaney, 1986 for a review). The current findings indicate that gender and the previous experiences

with to-be-remembered materials may be important variables to consider in investigations focusing the relationship between mood and memory.

Within the context of successful mood induction, the results that self-ratings of negative mood scores remained unchanged in the computer measurement administered after the mood induction procedure clearly demonstrate the non-equivalence of computerised and paper-&-pencil assessment of mood states (i.e. George et al., 1992; Lewis et al., 1988; Tseng et al., 1992). More importantly, the present study offers support that this heightened negative mood may be elevated by computer anxiety. Computer anxious people are likely to feel increased arousal as a result of HCI (Powers, 1973), which could summate with their underlying arousal produced by the naturally biological processes and thereby cause them to experience greater negative mood. In addition, heightened negative mood in CBT may be caused by the cognitive disposition of computer anxious people to focus on their negative thoughts and negative aspects of their selves during interacting with computers (Glass & Knight, 1988). When measured by CBT mood assessment, subjects with computer anxiety in the present study might have been focused on their negative thoughts or aspects of self, which in turn influence their self evaluations of mood change in responding to the VMIP.

The findings in the present study raise important questions concerning the equivalence of CBT and P&P mood assessment. It has been said that the non-equivalence between the CBT and P&P format is typically small enough to be considered inconsequential (i.e. Moreland, 1987). Most of previous studies concerning between-modality comparison often focused on establishing the psychometric equivalence by mean score or rank ordering comparison. Such an approach, although reasonable, is incomplete and premature because the underpinning assumption for these studies is that non-equivalence across administration modalities should appear as a result of mean score or rank ordering differences. The present

findings, nevertheless, indicate that the nonequivalence between the modalities may not necessarily reflect in these psychometric differences. When affective ratings administered prior to the VMIP, no significant mean differences are between the two modalities are found. But affective ratings from the two formats correlate differently with the measure of computer anxiety, suggesting that CBT administration may yield non-equivalent results when administered to a computer anxious person. Individual characteristics such as computer anxiety thus appear to be an important factor in the application of computers for psychological testing but not an issue when using conventional testing procedure.

This finding has important implications for the clinical practice of computerised mood assessment. Computerised mood assessment certainly has a variety of advantages, such as its production of reliable standardisation of administration procedures (Glaze & Cox, 1991; Maruff et al., 1994) and reaction time can be easily assessed to enhance the reliability and validity of the measurement (Ryman et al., 1988). However, more caution will need to be exercised when interpreting scores obtained from any computerised assessment. Without consideration of individual differences such as computer anxiety levels, generalisation of computerised scores to those obtained from P&P assessment may be not uniformly acceptable. Scores obtained from subjects with moderate computer anxiety may reflect a negative reaction as a response to computerised testing, rather than towards the actual construct being measured in the standard version. The interpretation of individual scores could therefore be ambiguous and confounded if the norms for interpretation are derived from the standard version of the tests. The confounding would be more severe in groups of people with computer anxiety, and the solution may reside in the establishment of separate norms for the computerised version of mood scales.

CHAPTER 7
SELF-AWARENESS AND COMPUTERISED MOOD ASSESSMENT

7.1 Introduction

Mood is a private, subjective, and by definition a hypothetical construct. As a hypothetical construct, mood can only be measured by indirect indication of its presence. As reviewed in Chapter 2, there are two major types of mood measurement: self-reports and the so-called "behavioural" measures. Due to inconsistent results in the literature, using behavioural measures alone to indicate the presence of mood has been said to be premature, so that in research they are often used simultaneously with self-reports (Morris, 1989).

Although self-reports are frequently employed for mood assessment, the reporting process of mood has been said to be dependent not only upon internal stimuli but also upon the quantity and quality of interactions between individual characteristics and external stimuli (Pennebaker, 1982). As suggested in Chapter 1, situational stimuli may influence the self-reporting processes through increases in subjective degrees of arousal or self-focused attention.

With respect to self-focused attention, considerable evidence has suggested that self-reports of mood are increased by self-focused attention (see Gibbons, 1990; Matthews et al., 1982 for reviews). Two different approaches have been taken concerning how attentional focus is varied in the laboratory. One technique involves the use of self-report instrument to identify and select persons who differ from each other in their dispositional tendencies to be self-attentive. The second technique relies on experimental manipulations such as placing a mirror in front of a person to alter his/her momentary level of self-attention. In a recent review, Gibbons (1990) concluded that a positive correlation between depression and self-focused attention has been demonstrated with various measures of depression, with both situational and

dispositional measures of private self-focus, and in both clinically depressed and nonclinical samples. Additional evidence of a link between self-focused attention and affective experiences has come from studies concerning individual differences in susceptibility to the Velten Mood Induction Procedure (VMIP; see Chapter 5). Several studies have found that greater changes in mood are reported by participants for whom self-focused attention being increased by experimental manipulations or for those scoring high on the trait measure of private self-consciousness (Carver & Scheier, 1978; Scheier & Carver, 1977).

In the light of self-awareness theories, it would thus be possible that CBT administration may provoke similar characteristics such as when a mirror is used to increase a person's momentary self-focused attention, and which in turn heightens a person's dominant mood states (see Chapter 1). Regarding the equivalence of CBT and P&P mood assessment, it is necessary to demonstrate that mood scores in CBT correlate to the same degree with an external variables such as private self-consciousness as do with those obtained from the P&P administration.

The chapter reports two studies which aimed to examine the effects of the CBT administration upon momentary self-focused attention. It is hypothesised that the non-equivalence results of CBT and P&P mood assessment is a function of increases in self-focused attention by the presence of a computer in the CBT format. Self-focused attention was measured by the frequency of using first-person singular pronouns (Wegner & Giuliano, 1980). Subjects will choose more first-person singular pronouns as an index of increased self-focused attention when affective ratings are administered in the CBT format.

7.2 Overview of Methods

This chapter consists of two studies which examined the relationship between administration formats and momentary self-focused attention. Subjects in the two

studies completed the self-report measurement of their transient mood and then a measure of momentary self-focused attention administered by different assessment modalities. In study 1, these measures were administered by either the CBT, card, or P&P format. In study 2, only the CBT and P&P administration formats were employed.

In the literature, a number of measures have been constructed to gauge whether attention is more likely or more fully allocated inward toward self-relevant material (see Palfai & Salovey, 1992 for a review). One of the more commonly used measures in recent mood induction studies is the *Linguistic Implications Form* (Wegner & Giuliano, 1980). Another commonly used indicator of self-focused attention is by categorising individual differences in dispositional tendencies to be self-attentive as measured by the *Self-Consciousness Scale* (SCS; Fenigstein et al., 1975). The characteristics of these scales are discussed as follows and examples of these measures are presented in Appendix I.

7.2.1 Measurement of Self-Focused Attention

Linguistic Implications Form. The measure consisted of 5 sentences which were drawn from the measure developed by Wegner & Giuliano (1980). In this task, subjects are asked to fill in a blank within a sentence with one of three pronouns: first-person singular, first-person plural, or third-person singular. The task is presented to the subject as one in which they are to choose the pronoun that seems to fit best in the sentence. Self-focused attention is indexed by the use of first-person pronouns. Previous studies (Carver & Scheier, 1978; Davis & Brock, 1975; Wegner & Giuliano, 1980; Wood et al., 1990) have suggested that subjects exposed to a mirror, which is a common experimental manipulation employed to increase subject's momentary self-focused attention, are more likely to choose first-person singular pronouns (i.e. *I, me, my*).

Self-Consciousness Scale (SCS). The scale was developed by Fenigstein et al. (1975) to measure individual differences in chronic predisposition to be self-attentive. This scale consists of 23 Likert-type statements. Each statement is rated on a 5-point scale ranging from "0= Extremely uncharacteristic" to "4= Extremely characteristic." Factor analyses of the scale have revealed two separable aspects of self-consciousness: "private" and "public," and one subscale of "social anxiety." The SCS has been reported to have fairly good test-retest reliability for each subscale, with correlation of 0.84 for public self-consciousness, 0.79 for private self-consciousness, and 0.73 for social anxiety (Fenigstein et al., 1975).

The private self-consciousness subscale measures awareness of the more personal and covert aspects of the self. The public self-consciousness subscale is designed to measure the tendency to be aware of the publicly displayed aspects of the self, i.e. the self as a social object that has an impact on others. The private-public distinction has obvious implications for research concerning the relationship between self-awareness and self-reports of mood or bodily states. It has been conceptualised and empirically found that people high on this private dimension are presumed to be particularly attentive to their thoughts, feelings, and attitudes (see Matthews et al., 1982 for a review). In addition, individual differences in private self-consciousness have yielded precisely the same effect on dependent measures as have mirror-manipulated differences in self-focused attention to make a person more responsive to the VMIP (Carver & Scheier, 1978; Scheier & Carver, 1977; see also Goodwin & Williams, 1982).

7.2.2 Data Analysis of Affective Ratings

Self-reports of transient mood were measured with visual analogue mood scales (VAMS). As most of the variables in the VAMS were highly interrelated, three summary variables, i.e. "Positive Mood," "Negative Mood," and "Elation," were

derived by linear combination of the individual variables in the VAMS (see Chapter 4 and 6 for more details).

As mentioned above, subjective degrees of self-focused attention have been often found to correlate with self ratings of transient mood (e.g. Wood et al., 1990; see also Gibbons, 1990 for a review). In examination the effects of administration formats upon subjective degrees of momentary self-focused attention, an analysis of covariance (ANCOVA) was employed to covary out the influence of subjective transient mood, i.e. using the summary mood score of "Elation" mood as a covariate.

7.3 Study 1

7.3.1 Brief description of Methods

The details of the whole procedures and design of this study are as reported in Chapter 4. Subjects were 42 volunteer secondary school students, and were randomly assigned to one of three conditions, i.e. the CBT ($\underline{N}$ = 16), card ($\underline{N}$ = 16), and P&P ($\underline{N}$ = 10) condition. Subjects were tested individually, and were given the VAMS and then the Linguistic Implications Form administered by the testing format according to their assigned conditions. Immediately afterwards, participants in the CBT and card condition were administered with two psychomotor tasks, followed by an alternative version of the VAMS administered by the reverse testing format.

7.3.2 Results and Discussion

Self-focused attention differed significantly as a function of administration modes after covarying out the effect of subjective transient mood states. The number of first-person singular pronouns was analysed by an analysis of covariance (ANCOVA), with the pretested mood scores as the covariate. The effect of administration format was significant (F = 3.88, d.f. = 2,38, $p < .05$) but the

covariate was not (F = 0.99, d.f. = 1,38, *n.s.*). The covariate-adjusted means are presented in Table 7.1.

The same analyses were conducted to compare either the CBT, card, and P&P administration with each other. Subjects in the card administration condition chose significantly less first-person pronouns than did those in the CBT condition (F = 5.44, d.f. = 1,29, $p < .05$) and P&P condition (F = 4.37, d.f. = 1,23, $p < .05$). No significant differences were found between the CBT and P&P conditions (F = 0.37, d.f. = 1,23, *n.s.*), although the effect of covariate was significant (F = 6.51, d.f. = 1,23, $p < .05$).

The findings suggested that self-focused attention differs as a function of assessment instruments employed in these conditions. Subjects in the card condition reported significantly less self-focused attention than do those of the other two conditions. No significant differences of self-focused attention between subjects in the CBT and P&P condition were found.

These results can be interpreted by the fixed-capacity model of attention, i.e. a "mutual antagonism" which may exist between focus on the self and focus on the environment: as attention outward increases, attention to the self presumably diminishes, and vice versa (see Matthews et al., 1982 for a review). The less self-focused attention revealed in the card administration condition may imply that subjects in this condition pay more attention outwardly towards the completion of the card-administered test.

Consistent with previous researches (Sedikides, 1992; Wood et al., 1990), the significant effect of the covariate variable (i.e. affective ratings) suggests that self-focused attention and mood states may reflect a vicious cycle, with moods inducing self-attention and self-attention in turn exacerbating the dominant mood. As already reported in Chapter 4, self-reported negative mood scores such as "fatigue" were heightened in CBT when compared with the P&P format. That no differences of self-

Table 7.1 Adjusted-Mean Number of First-Person Singular Pronoun as a Function of Administration Modes

	Administration Mode[a]			Mode effect	
	CBT	Card	P&P	F[b]	Covariate
	M (SE)	M (SE)	M (SE)		Effect (F)
Self-Focus	2.21 (0.22)	1.47 (0.23)	2.39 (0.29)	3.88*	0.99
Between-Mode[c]					
	2.23 (0.21)	1.52 (0.21)	--	5.44*	0.99
	2.14 (0.23)	--	2.37 (0.29)	0.37	6.51*
	--	1.53 (0.24)	2.36 (0.30)	4.37*	0.45

[a] N = 16 for the CBT and card administration group, and N = 10 for the P&P group.

[b] The mode and covariate effects were obtained in one-way analysis of covariance, in which the administration mode was the independent variable, the number of first-person pronoun was the dependent variable, and affective rating was the covariate. * $p < .05$

[c] Compare either the CBT, card, and P&P administration with each other.

focused attention were found between the CBT and P&P condition may suggest that self-focused attention does not account for the between-modality nonequivalence results.

However, the conclusion needs to be tentative because of methodological considerations. Momentary self-focused attention has been reported to be influenced not only by the situational stimuli but also by individual differences of dispositional self-consciousness (see Gibbons, 1990 for a review). Because dispositional self-consciousness was not measured and controlled in the present study, the current findings of self-focused attention between the CBT and P&P condition may be attributable to random group factors.

7.4 Study 2

The results of Study 1 support the reasoning that self-focused attention differs as a function of administration formats. However, one might argue that it has resulted from individual differences of dispositional self-attention rather than the characteristics of the instruments. To allow revaluation in the light of such a criticism, a dispositional self-attention measure using the Self-Consciousness Scale (SCS, Fenigstein et al., 1975) was introduced.

The rationale of study design and procedures for the present study was recorded in Chapter 6 above. As in Study 1, subjects completed the Linguistic Implications Form administered by either the CBT or P&P format after their mood assessment. It was predicted that self-focused attention would be heightened in the CBT condition, if the computer does indeed serve a function in a way similar to a mirror. On the other hand, if a computer serves to increase emotional arousal or anxiety, less self-focused attention will be found in the CBT condition.

The present study also examined the influence of relative individual characteristics upon the between-modality equivalence concerning self-reports of mood change as experimentally induced by the VMIP. Self-ratings of mood change from the CBT and P&P format were hypothesised to correlate disproportionately with individual characteristics such as measures of dispositional "private self-consciousness" and "computer anxiety."

7.4.1 Brief description of Methods

Subjects were 108 volunteer psychology students. They were randomly assigned to either the CBT ($\underline{N}$ = 54) or P&P ($\underline{N}$ = 54) administration condition, and completed the VAMS and then the Linguistic Implications Form administered by the format according to their assigned conditions. Next, all participants were given several cognitive tasks administered in the CBT format, and then engaged in the

computerised VMIP. After the VMIP, they received an alternative VAMS tested in the same format as their assigned conditions. Finally, all subjects completed the P&P versions of the SCS and the Computer Anxiety Rating Scale (CARS; Heinssen et al., 1987).

7.4.2 Results and Discussion

In contrast to Study 1, subjects in the CBT condition reported less momentary self-focused attention than those in the P&P condition when the dispositional tendencies to be self-attentive were matched between both conditions. The mean scores of the self-focus measures for each condition are presented in Table 7.2. There were no significant differences on the mean scores of the three subscales in the SCS between the two conditions, indicating that participants in both conditions were matched with the dispositional tendencies to be self-attentive.

Significant difference of momentary self-focused attention, however, was found between the conditions (t = 2.93, d.f. = 106, $p < .005$). Similar to Study 1, an analysis of covariance (ANCOVA) was conducted to examine the effect of the administration format on momentary self-focused attention by covarying out subjective ratings of "elation" mood. The analysis revealed that subjects who received CBT reported less self-focused attention than did those tested by the P&P format (F = 7.90, d.f. = 1,105, $p < .01$). The result suggested that attention was more likely allocated inward towards self-relevant aspects during P&P assessment than the CBT administration.

Consistent with Study 1, self-reports of mood were found to correlate with subjective degrees of momentary self-focused attention. Correlational analyses revealed that self-focused attention correlates negatively with self-reported "positive mood" when both groups were combined together (r = -.21, d.f. = 106, $p < .05$). The correlation coefficients are presented in Table 7.3.

Table 7.2 Mean Scores of Dispositional and Momentary Self-Focused Attention for Each Condition

	Condition[a]		
	CBT	P&P	*t*
Measures of Self-Focus	M (SD)	M (SD)	
SCS			
Private Self-Consciousness	35.76 (4.9)	35.91 (6.8)	0.13
Public Self-Consciousness	25.84 (4.3)	24.67 (6.5)	1.10
Social Anxiety	18.84 (5.0)	18.09 (5.6)	0.73
Self-Focus Attention			
No. of First-Person Pronouns	2.20 (1.0)	2.78 (1.0)	2.93*

[a] N = 54 for each condition. * $p < .005$

Table 7.3 Correlation Coefficients of Self-Focused Attention and Affective Ratings

	Administration Mode[a]		
Pre-VMIP Mood Scores	CBT	P&P	Both Groups
Positive Mood	-.17	-.23*	-.21*
Negative Mood	.08	.01	.03
Elation	-.14	-.14	-.13

[a] N = 54 for each group. * $p < .05$

In examination of the interactions between individual characteristics and the reactiveness to the VMIP, self-ratings of mood change from both administration formats were correlated to the measures of dispositional private self-consciousness and computer anxiety respectively.

As expected, dispositional private self-consciousness correlated significantly with elated mood change when measured by the P&P format ($r\,(52) = .26, p < .05$), but no significant correlation were found with those tested in the CBT administration ($r\,(52) = -.06$, *n.s.*). On the other hand, individual differences in computer anxiety correlated with self-reported mood change tested with the CBT format ($r\,(52) = .24, p$

< .05), but no significant correlation was for the P&P administration ($r\ (52) = .03$, *n.s.*). Consistent with previous research (Carver & Scheier, 1978; Scheier & Carver, 1977), subjects high in private self-consciousness reported more responsiveness to the VMIP than those low in private self-consciousness when such responsivity was assessed by the conventional P&P method. In the context of CBT mood assessment, individual differences in computer anxiety but not private self-consciousness were found to correlate with responsiveness to mood changes. The correlational coefficients are presented in Table 7.4.

The findings of asymmetric relationships between individual characteristics and administration formats, together with the decrease of momentary self-focus in the computer condition, demonstrate that CBT mood assessment is not an equivalent format of its P&P counterpart. Furthermore, the current findings suggest that the heightened negative mood in CBT is more likely due to an increase of anxiety or arousal rather than self-focused attention. When interacting with the computer, computer anxious people often reported feeling changes in physiological arousal

Table 7.4 Correlations between Self-Reported Mood Change and Individual Differences for Each Condition

	Individual Differences			
	Computer Anxiety		Private Self-Consciousness	
Conditions[a]	CBT	P&P	CBT	P&P
Mood Change[b]				
Positive Mood	.28*	-.06	-.08	.24*
Negative Mood	-.21*	-.08	-.05	-.25*
Elation	.24*	.03	-.06	.26*

[a] N = 54 for each condition.

[b] Summary scores of the VAMS. Mood change for each summary score was calculated by subtracting the pre-VMIP mood score from the post-VMIP mood score.

Level of significance for one-tail test: * < .05

(Powers, 1973) and to focus on their negative thoughts (Glass & Knight, 1988). CBT administration may compel them to selectively monitor and label the presence of internal feelings confirming their expectations when they answer questions via a computer.

7.5 General Discussion

By revealing the asymmetric relationships between individual characteristics and testing formats, the findings indicate that computerised mood assessment is not equivalent to the standard P&P modality. When mood assessment is administered by the conventional P&P format, the results confirm the relationship between self-focused attention and affective ratings postulated by self-awareness theories (see Gibbons, 1990; Matthews et al., 1982 for reviews). The negative correlation between self-reported positive mood and momentary self-focused attention suggests that there may be a cyclical relationship between self-focus and mood states (Wood et al., 1990). Similarly, the dispositional private self-consciousness is found to heighten a person's awareness of, and responsivity to, the induced mood.

But such a relationship is not obtained when mood assessment is administered with the CBT format. In comparison with the CBT and card administration, the overall greater self-focused attention revealed in the P&P format implies that both the CBT and card administration may be more demanding, and are likely to draw a person's attention towards the self-aspects which are relevant to the situational stimuli.

The current findings of less self-focused attention revealed in the CBT condition is consonant with that of Kiesler et al.(1984) who measured self-focused attention after using a computer as a communication medium. The results were interpreted by these authors as suggesting that computer-mediated communication provides a condition that is important for de-individuation, including anonymity and reduced self-regulation. However, this reasoning cannot be extended for interpretation in the

present findings because there were no differences in anonymity between the assessment conditions, and the issue here concerns the consequences of being exposed to a computer when self-reports of mood are measured.

Completing a mood questionnaire has been said to draw a subject's attention inward because mood experience falls in the private aspects of self (Matthews et al., 1982). However, the attention shifts back and forth between the self and external stimuli on a continual basis. According to the fixed-capacity model of attention (Matthews et al., 1982; Pennebaker, 1982), such shifting is not random. Rather it seems to be guided in part by the cue implications that are conveyed by the most recent object of attention. That is, when we attend to the self, we are often examining an aspect of self that has been suggested by some cues in our environmental context. Generally, when we look outward, we are often examining a part of the external world that has been suggested by some cues from within. If the last object of attention has been an environmental event that has been recognised as "typically anxiety-provoking", an inward focus of attention might be guided specifically to those self-aspects associated with the experience of anxiety. Indeed, it has been reported by Glass & Knight (1988) that computer anxious people are more likely to focus on the negative aspects of their thoughts and self when interacting with computers. In this case, the artefacts employed for mood assessment (e.g. a computer) may influence a person's attention to selectively focus on the aspects of internal materials in ways which differ from the P&P format.

In conclusion, the current findings support the contention that affective ratings measured using the computer are not equivalent to those measured in the conventional P&P modality. The effect of the computer upon the self-reporting processes of mood may compel a person to focus on the aspects of self different from those when measured using the conventional modalities. Which internal aspects will become more

accessible may depend upon the interaction of individual characteristics and the administration formats.

CHAPTER 8
GENERAL DISCUSSION

8.1 Introduction

The main focus of these studies has been the determination of whether self-reports of mood change via CBT would be equivalent to its conventional P&P counterpart and, in particular, to examine the possible effects of HCI factors upon such self-reporting processes. In general, the findings demonstrate self-reports of mood change to be determined not only by factors associated with either the biological rhythms (Chapter 3) or experimental mood manipulation (Chapter 6), but also by the perception of the measurement instruments. A consistent finding across the empirical studies reported in this dissertation was that heightened negative mood scores were revealed in CBT, suggesting the two testing modalities to be psychometrically non-equivalent.

Furthermore, these experiments uphold the contention that such psychometric non-equivalence is not a result of computerisation *per se*. In examining the between-modality equivalence, most previous studies reported in the literature have focused on the psychometric comparison with an underpinning assumption that the non-equivalence between administration methods should appear as a result of mean score or rank ordering differences (see Chapter 1). Unlike these studies, this dissertation presents an attempt to identify relevant individual differences that contribute to such nonequivalence. Mood scores obtained from the two modalities correlate divergently with measures of "computer anxiety" and "private self-consciousness," so that the between-modality equivalence should vary as a function of these variables (Chapter 7). Other HCI factors such as response device options and item presentation factors are, in my view, less important in determining the between-modality comparison of affective ratings (Chapter 4).

I propose a number of reasons why the computer administration yields heightened negative mood scores when used with those computer anxious individuals. Given that any person has a limited capacity to process information, external and internal sensory data often compete for processing time. As such, the probability of noticing and reporting internal states, whether specific mood or broader categories of body states, will be related to the quantity and/or quality of external information as well as to the schema or hypotheses available to the person. Computer anxious people often report themselves to have increased physiological arousal or lower expectations of performance whilst interacting with computers (see Chapter 1). Thus, it is most likely for them that they selectively monitor and label the presence of increased arousal in a way consistent with their negative expectations when they are confronted with a computer.

The discussion within the first part of this chapter deals with particular concerns related to mood measurement and its self-regulatory nature. Much of the remainder of the chapter puts forward the theory that computer anxiety is only one manifestation of the various emotional and attitudinal reactions towards computers and their use. The introduction of this new technology to society appears to have created a climate of apprehension about computers in general. In particular, such apprehension influences components of self-reporting in ways far removed from any instrumental use of this new technology. Finally, the professional and ethical issues associated with computer utilisation in the conduct of the mental health services are discussed.

8.2 Self-Awareness and Mood

From the evidence presented in Chapter 3, there are considerable physiological, psychological, and behavioural fluctuations which relate to the female menstrual cycle. Although self-reports of such menstrual fluctuation are influenced by the instruments employed for data collection, this does not mean to say that such self-reported

accounts from these women do not reflect their real experiences of their menstrual cycles. Rather, it might lead one to suggest that how percepts of biological change are interpreted depend upon the interaction between one's immediate situational circumstances and the schema or hypotheses available within that particular context. Even though subject self-reports are determined by a multitude of psychological influences, it must be emphasised that they are not randomly reported. In fact, each of the various studies conducted for the preparation of this dissertation found that self-reports of mood closely related to the interaction between an individual's dispositional tendency and the context in which an individual answers the question. Hence, self-reports in this case are cognitively predictable, and are not merely determined by the underlying biological fluctuation.

Therefore, the problem associated with self-reports of mood and bodily states is that internal sources of information are not the only determinants of the self-reporting process. On the contrary, people seem to make extensive use of information from their environment when defining for themselves what their own internal experiences are. One resolution of the problem would be to conduct studies which measure cognitive functions or behaviours associated with mood change other than those simply employing self-report methods alone which are likely to be contaminated by expectations or other psychological factors. Various cognitive tasks, including psychomotor and memory tasks, have been examined in the experimental phase of this dissertation and were found to correlate with self-reports of mood states (see Chapter 4 and 6). Such cognitive tasks also helped to distinguish different kinds of mood states. Eysenck (1992) suggested that depressed individuals, in contrast to anxious individuals, typically show psychomotor retardation, rather low effort expenditure, low distractibility, and possibly a lack of attentional selectivity to salient stimuli. This presentation pattern for depressive individuals appears to reflect a passive

disengagement from the external environment whilst anxious individuals display very active engagement with the external environment.

The finding of a non-randomised distribution with respect to women's visits to the hairdressing salon across their menstrual phases is evidence for a close relationship between mood and behaviour (see Chapter 3). In a number of such ways, people attempt to perpetuate their positive mood and, perhaps to an even greater degree to eliminate their negative mood. As negative mood is often experienced by women premenstrually, they may use a wide variety of strategies to modify their premenstrual discomfort. Such self-management techniques may be consciously employed, but probably there is only low awareness of the process much of the time. With this understanding of self-regulation of mood based on a conditioned behaviour to enhance mood, objective studies of behavioural change associated with the menstrual cycle are possible. The self-regulatory nature of mood needs not, however, be belaboured. What must be emphasised instead is the fact that people often misattribute the determinants of their own mood (e.g. T. D. Wilson et al., 1982). This inability to be aware of and report the causes of mood change indicates some failing in awareness of the relevant dynamic importance of cognitive and biological factors as mood determinants. Therefore, cognitive tasks and behavioural observations may highlight the need for extensions beyond the methodology of self-reporting rather than simply providing a means of validating self-report measures. As we gain knowledge about a mood's influence on various cognitive functions and behaviours, it becomes increasingly possible to use the latter as surrogate measures of mood.

The association between mood and self-regulatory behaviours is likely to be highly complex, involving feedback loops and ongoing mood-behaviour interactions. Individuals who continue to fail to perceive, misperceive, or even overperceive mood are less likely to initiate self-regulatory behaviours in maintaining their mental health. To appreciate the complex mood-behavioural link, several theories have suggested that

accurate self-observation or self-monitoring are important for self-regulatory behaviour to occur (Carver & Scheier, 1982; Kanfer, 1970). Carver & Scheier (1982), for example, proposed self-focused attention to be a key variable in determining whether self-regulatory responses occur.

Thus it appears that accurate self-observation over time is the most important factor for the identification of mood antecedents and the subsequent choice of effective activities to remedy negative mood. The practical value of accurate self-observation in self-regulating distressed mood has been recognised in a number of psycho-therapeutic techniques (e.g. behavioural activation assignment according to Beck, 1976). Clients may suffer from distressed mood because of failure to recognise the close relationship between mood and self-regulatory behaviour. The therapist needs to encourage the client to identify pleasure-producing activities and to overcome any obstacles in performing them, together with accurate assessment of their value in mood improvement. The clients are urged to experiment with activities and to discover for themselves whether activities make a difference to their mood, no matter how small. The therapist and client thereby collaborate to identify possible pleasurable or meaningful activities, and then anticipate and deal with possible actual or cognitive obstacles to undertaking them. The results reported in Chapter 3 suggest that there are natural support systems and informal caregivers (e.g. sympathetic hairdressers) who are capable of alleviating people's mental distress. A wide variety of strategies which people use to modify their mood has been recently reviewed by Morris (1989). These include self-reward, alcohol consumption, distraction, expressive behaviour, cognitive transformation, problem directed action, exercise, and affiliation (i.e. seeking associations with others).

Nevertheless, there are substantial individual differences in experiences of mood change and the anticipation of the effectiveness of self-regulatory behaviour. For example, one woman may react strongly to a self-reward activity such as visiting a

hairdressing salon, while another might not. One woman may experience a depressive mood during the premenstrual phase, but another may feel more depression during her menstrual phase. Although there are substantial individual differences, the results of my study in examining the correlation between personality traits and self-reports of mood change (see Chapter 7) has shown stable relationships to exist for each person in the awareness of mood change. Increasing evidence accumulates to show that once the background endogenous rhythm is established, it is possible to predict very accurately the cyclical phase at which positive and negative mood will naturally occur (Thayer, 1989). Once the self observation of antecedent-mood relationships is confirmed, it is likely that effective self-reward activities may be sought. I would suggest that a given activity would be more confidently generated to reflect self-regulation of mood if it can be shown that mood subsequently improves (see Chapter 3). When such information is realised, the individual might become aware of the integral relationship between such a self-therapeutic activity and mood so that a person's mental health can thereby be enhanced.

Thus, a longitudinal approach, together with a battery of behavioural measurements which accompany self-reports of mood appear to provide a better approach for the understanding of mood change. Such a systematic and longitudinal approach is especially important for an understanding of the self-regulatory nature of mood.

8.3 Anxieties Associated with Computers

The main finding of this thesis is that the emotional involvement within HCI (e.g. computer anxiety) casts powerful psychological influences with respect to the self-reporting processes in the computer testing situation. The tendency to attend to, and report , the object which gives rise to the sensation rather than the sensation itself is not distinctively associated with self-reports of mood. Such a tendency has been

long recognised by students of sensations and psychophysics. Titchener (1909) called it the "objective error", but it is more generally referred to as the "stimulus error." Frude (1983) suggested that any object may elicit sensations and emotions from people, either directly by virtue of some basic stimulus feature, or indirectly through the mediation of "animism." A knife, for example, is a physical object with a sharp edge. But when it comes to be a part of eating or killing, it becomes a meaningful object to be often associated with butter or with blood respectively.

If the results for the case of computer use are an exception to the general rule, that there is a subjective side to people's relationships with external objects, it is only insofar as the computer raises this commonly known phenomenon to a higher power, and gives it a new form as well as a new degree (Turkle, 1982). Unlike much older technology, the introduction of computers has been extremely rapid and has affected the lives of even those who have never directly used or even seen them (Turkle, 1984). Observations of HCI often reveal that there is an extraordinary range of textures, tones, and emotional intensities to the ways in which people relate to computers - from seeming computer dependency to computer phobia (see Chapter 1). Simons (1985) speculated that the computer will evoke strong fears if "... the computer proves to be a quite sufficient companion, then the seeds of anthrophobia (fear of other human beings) may develop in the obsessive programmer, the hacker ... the computer is clearly a potentially fertile source of phobic conditions" (cited in Shotton, 1989, p. 239).

The widespread concerns about computers and their impact upon society provide a general background of emotional reactions to the computer even for those who have never used it. Shotton (1989) argued that there is a cultural ground in the Western world which fosters the development of anxieties or fears associated with the computer. Fear or anxiety associated with the computer is not a new occurrence. The fear directed towards the computer resembles that of many labour saving devices since

the beginning of the Industrial Revolution in which their use can lead to de-skiling of the labour force, job stress, and large-scale unemployment in certain industries, with serious consequences for people who do not have computing skills. Although the computer is not so readily available to the wider population as are the television and telephone, there has been widespread concerns about its sociological and psychological impacts upon individuals. Concerns about adverse effects of computerisation on individuals and their social lives have led to the coining of the terms "computerphobia," "computer addictions," and "alienation or dehumanisation," and are now commonly encountered in the popular press. Furthermore, computers have introduced a whole new vocabulary to the world. The term "technobabble" refers to the language of the computer industry, and has been applied to extra-computer contexts such as human thought processing and interpersonal interactions (Barry, 1993). And since this language is often concerned with processes that seem at least superficially analogous to those which go on in cognitive humans, this language is brought into everyday vocabulary. It is not surprising that people often develop feelings or attitudes about computer use whether they have experiences with computer use or not.

Feelings about computers, no matter how they are generated, can become formalised into ideologies of computer use, into beliefs about what a computer can, will, and should do. Such internalisation may catalyse a change in the ways in which we think about ourselves when we interact with computers. Turkle (1980) considered the computer as a projective medium like the Rorschach, a projective measure better known to clinical psychology. In the Rorschach, an individual is presented with an ambiguous stimulus, a set of inkblots. How people respond to them is said to provide a window onto their deeper concerns. And so it might be with the computer. Thus, the computer is "... an exemplary 'constructed object,' a cultural object which different people and groups of people can apprehend with very different descriptions

and invest with very different attributes. Ideas about computers become easily charged with multiple meanings. In sum people often have stronger feelings about computers than they know" (Turkle, 1980, p. 15).

As a culturally constructed object, it is likely that there are potentially cultural and ethnic differences in people's attitudes towards computer use. Unlike the Western world, the computer technology in those newly industrialised countries, for example my home country of Taiwan, is often perceived as central to developing a dynamic economy that is competitive internationally, and thus essential for economic health and well-being. Computerisation and technological innovations in Taiwan are often associated in the minds of most people with immense benefits, for example, in creating employment and in making many social practices more convenient. Cultural differences in the view of the possible psychosocial roles that the computer plays are likely to influence the relationships people form with computers. If people's relationships with the computer are highly related to cultural and social attitudes towards computerisation, are the present findings going to be true for cultures other than Western ones? My own hunch is that it is only the social attitudes towards computer use, as opposed to the direct experiences of HCI, that will be different across cultures. In Taiwan, the society as a whole may be less resistant to taking on large-scale computerisation because the computer is perceived as a cost-effective and useful tool. Nevertheless, the computer's capacity to elicit emotional reactions from people within a direct HCI is much more universal because the emotional relationships are formed by the mediation of "animism." The arrival of computer games in Taiwan has raised worry of its impact upon the population of adolescents who have been often reported to be addicted to playing computer games. Industrialisation for economic growth in Taiwan has often been pursued at the expense of environmental pollution and general social well-beings. Parents' preoccupation with the pursuit of economic well-being has deprived them of the time needed to be spent with their children. The

problematic issue of computer game addiction may thereby reflect a case of an inanimate object being used by our adolescents as a substitute for a real intimacy with their parents. Similarly, negative feelings towards computer use in Taiwan is likely to occur through the debilitating form of frustration because of the poor interface design in Chinese writing systems which require highly developed and skilful keyboard operation.

I contend that it is such feelings towards, and personal reconstruction of, the computer, although often projective in origin, which govern the quality and/or quantity of HCI. The computer industry often presents the computer as providing a "neutral tool" that can enter our daily life in a positive and non-disruptive way, and selectively ignores the potentially negative psychological effects of computerisation. There is no doubt that the computer can be an efficient tool, but people have always been shaped by their artefacts. People make tools, but the tools in turn influence people. This process has been explicitly expressed by Vygotsky (1987, p 3):

> "tools, whether practical or symbolic, are initially 'external': used outwardly on nature or in communication with others. But tools affect their users: (for example) language, used first as a communicative tool, finally shapes the mind of those who adapt to its use. Neither hand or mind alone suffice; the tools and devices they employ finally shape them."

Clearly, there is a gap that separates the industrial enthusiasms for the instrumental use of computers from scientific speculation about the powerful effects of computerisation upon people's well-being. Computerisation certainly makes many practices more efficient, but "efficiency wedded to indifference is a cold abstraction of a human being" (Romanyshyn, 1992, p.91). The empirical inquiry concerning the possible social and psychological outcomes of any technological innovation are important. Such inquiry will help us to gain a better understanding not only the pros

and cons of present computer systems, but also provide considerations for future computer system design and development.

8.4 Microcomputer Technology and Clinical Psychology

The newly developed computer technology not only paves a new pathway for assisting and fulfilling the routine conduct of psychological testing but also has pervasive influences on client's well-beings (Ager, 1991). Computerised testing has already shown its greatest strength for the standardisation of procedures and in its wealth of data collection which may not be so readily available when assessment is accomplished with conventional P&P questionnaires (Tseng et al., 1992).

The degree of emotional involvement with a computer also suggests the possibility of computer use for psychotherapy through careful software design. Recent technological advances in the portability of microcomputers have also offered considerable scope for human behaviour monitoring and self-regulation. As mentioned above, longitudinal self-evaluation of mood fluctuation should prove itself particularly helpful in increasing awareness of mood change so that effective self-regulatory behaviours can take place. But it is often difficult to collect data with such longitudinal approach, which often involves a great amount of data, and the recording and analysis of these data involve a substantial body of work. There is also the problem of subject compliance, because subjects completing unsupervised self-assessment might not be too careful in following the required procedures, and might even be tempted to falsify results just to complete the requirement. The concerns of data analysis, subject compliance, and procedural standardisation appear to be more easily accomplished by the careful use of lightweight portable and "hand-held" computers which can be continually and easily carried by participants throughout their daily routines (Burnett et al., 1985; Drummond et al., 1995).

Of course, we have no way of knowing for sure how information technology will develop, and what will be the impacts of the newly emergent products upon the routine conduct of clinical psychology. Neither can we know for sure whether people will respond to new products such as "hand-held" computers in similar ways to those put forward in this dissertation. Nevertheless the findings that there are emotional and attitudinal reactions toward computerisation, provide guidance for ethical considerations associated with computer utilisation in the clinical field in which clients are often required directly to interact with a computer system.

It is likely that both clinical psychologists and their clients may have their own, but perhaps different, emotional and attitudinal reactions towards microcomputer use. On the part of the professionals, choosing to pursue one instrument over another may reflect a perception that one is more valuable. Psychologists who believe in the use of such technology as a cost-effective and neutral tool alone, may prescribe computerised testing or therapy to their clients without considering the possible adverse effects. With respect to the client, such effects cannot be ignored if computerised measures are used for making critical decisions for diagnosis or treatment. Scores obtained from individuals with high levels of computer anxiety may reflect a negative reaction to the computer environment rather than to the actual construct being measured. The interpretation of such individual scores based on the norms derived from conventional methods, could be inaccurate. For the outcome evaluation of psychological treatment or self-monitoring requirement involved with microcomputers, therapists need to be aware of clients' emotional and attitudinal reactions towards such technology use before assigning treatment or self-observation involving computer use. It is not unknown for the computerphobic individual to be likely to avoid any interactions with a computer. Thus a computer anxious client may not benefit from such assignment because it may result in poor compliance.

To conclude, while the rapid development of microcomputer technology has brought and continues to bring powerful transformations upon the mental health services, it is essential to consider the possible psychological impacts of these technological innovations rather than to presume them to be neutral tools. The HCI factors discussed above may serve as guidance in assessing the pros and cons of the present information technology and its use, whilst providing direction for the development of future information systems used in the clinical environment. This thesis demonstrates that further research is urgently needed with a particular emphasis to be placed upon which of the many individual differences affect administration procedures of psychological testing. Until further systematic studies are completed, the clinician needs to be made aware of the possible influences of HCI factors upon their delivery of services if computerisation is to be involved in the process of assessing client mental health condition and assisting/maintaining client recovery.

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APPENDIX I

Questionnaires, Visual Analogue Mood Scales, and Cognitive Tasks

VISUAL ANALOGUE SCALES

There are several versions of Visual Analogue Scales (VAS) employed in the experiments. These include a 16-item version used in Chapter 3, a 9-item version used in Chapter 4, and a 8-item version used in Chapter 6. The 16-item version of VAS is presented in its original format. Only the item components are presented for the remained two versions. In addition, each version of VAS is accompanied with a sheet of instructions as follows:

Introductions for the VAS

This questionnaire is designed to assess how you feel at this moment, by means of a number of visual analogue scales.

These are 10 cm long lines, marked appropriately at the left and at the right with, for example:

For each question you are requested to put a cross (X) on the line, reflecting how much or how little of the 'symptom' or 'feeling' is affecting you **at this moment.** There are several questions which have 'if any' or 'if at all' after them, if you are not experiencing this symptom/feeling at all please encircle the '0'. If you make a mistake, score out the original cross, and clearly mark in another. Please answer all the questions and work as quickly and as accurately as you can.

16-Item VAS

Note. The VAS were employed to measure mood and physiological change related to the menstrual cycle as reported in Chapter 3.

How cheerful / happy do you feel?

Not happy at all — Extremely happy

0 ——————————————— 100

How irritable do you feel?

Not irritable at all — Extremely irritable

0 ——————————————— 100

How energetic and active do you feel?

Not energetic at all — Extremely energetic

0 ——————————————— 100

How depressed and unhappy do you feel?

Not depressed at all — Extremely depressed

0 ——————————————— 100

How fatigued and tired do you feel?

Not tired at all — Extremely tired

0 ——————————————— 100

How tense and anxious do you feel?

Not tense at all — Extremely tense

0 ——————————————— 100

How thirsty do you feel?

Not thirsty at all — Extremely thirsty

0 ——————————————— 100

How much breast tenderness do you have (if any)?

Not tender at all — Extremely tender

0 ——————————————— 100

How much (if at all) do you feel that your body is swollen?

Not swollen at all	Extremely swollen
0	100

How much period type pain do you have (if any)?

Not painful at all	Extremely painful
0	100

How much craving for sweet foods do you feel?

Not craving at all	Extremely craving
0	100

How much craving for savoury foods do you feel?

Not craving at all	Extremely craving
0	100

How sociable and friendly do you feel?

Not friendly at all	Extremely friendly
0	100

How hungry do you feel?

Not hungry at all	Extremely hungry
0	100

How nauseous do you feel?

Not nauseous at all	Extremely nauseous
0	100

How dry is your mouth?

Not dry at all	Extremely dry
0	100

9-Item VAS

Note. The VAS were employed in the study as reported in Chapter 4.

1. How cheerful / happy do you feel?
2. How irritable do you feel?
3. How energetic and active do you feel?
4. How depressed and unhappy do you feel?
5. How fatigued and tired do you feel?
6. How tense and anxious do you feel?
7. How concentrated do you feel?
8. How sociable and friendly do you feel?
9. How aggressive do you feel?

8-Item VAS

Note. The VAS were used to measure mood change in response to the Velten Mood Induction Procedure (VMIP) as reported in Chapter 6.

Items adminstered before the VMIP

1 How cheerful / happy do you feel?
2 How irritable do you feel?
3 How energetic and active do you feel?
4 How depressed and unhappy do you feel?
5 How fatigued and tired do you feel?
6 How tense and anxious do you feel?
7 How concentrated do you feel?
8 How sociable and friendly do you feel?

Items adminstered after the VMIP

1 How energetic and active do you feel?
2 How tense and anxious do you feel?
3 How concentrated do you feel?
4 How depressed and unhappy do you feel?
5 How cheerful / happy do you feel?
6 How fatigued and tired do you feel?
7 How sociable and friendly do you feel?
8 How irritable do you feel?

GENERAL HEALTH QUESTIONNAIRE (GHQ)

Full Name: _____ TEL No: _____

Age: (Please circle one age which you fall in.)

15 - 25 26 - 35 36 - 45 46 - 55

For most questions, please respond by circling the appropriate answer.

1. Have you recently been feeling perfectly well and in good health?

Better than usual	Same as usual	Worse than usual	Much worse than usual

2. Have you recently been feeling in need of a good tonic?

Not at all	No more than usual	Rather more than usual	Much more than usual

3. Have you recently been feeling run down and out of sorts?

Not at all	No more than usual	Rather more than usual	Much more than usual

4. Have you recently felt that you are ill?

Not at all	No more than usual	Rather more than usual	Much more than usual

5. Do you suffer from headaches?

Never Seldom Sometimes Often Very often

6. Do you experience weight changes during the menstrual cycle?

Yes No

7. Do you suffer from stomach-aches or indigestion?

Never Seldom Sometimes Often Very often

8. How often do you consult your G.P.?

Never Seldom Sometimes Often Very often

9. Are you currently taking any kind of contraceptive pill?

Yes No

10. What is the normal length of your menstrual cycle, i.e. how long between periods?

_____ days

11. When was the date of your last period, i.e., the day of the month when menstruation commenced?

_____/_____ (Day/Month)

12. How often do you work with computers?

Never Seldom Sometimes Often Very often

SOCIAL DESIRABILITY SCALE (SDS)

The following questionnaire is completely confidential, and is not a test of either intelligence or ability. There are no right or wrong answers.

Please answer each question frankly, and with your first reaction to it. Answer each question by using the five-points scale below:

1 = Uncharacteristic of me or not me
2 = Somewhat uncharacteristic of me or somewhat not true
3 = Neither uncharacteristic nor characteristic
4 = Somewhat characteristic or somewhat true
5 = Characteristic of me or true

To indicate your answer, simply circle the number that comes closest to describing you. Make sure that you answer every question.

	Untrue of me				**True of me**
1. I sometimes tell lies if I have to.	1	2	3	4	5
2. When I take sick-leave from work (or other situations), I am as sick as I say.	1	2	3	4	5
3. I am always courteous, even to people who are disagreeable.	1	2	3	4	5
4. Once in a while, I laugh at a dirty joke.	1	2	3	4	5
5. I sometimes try to get even, rather than forgive or forget.	1	2	3	4	5
6. I always apologise to others for my mistakes.	1	2	3	4	5
7. I would declare everything in customs, even if I knew that I could never be found out.	1	2	3	4	5
8. I never watch a sexually explicit film or TV show, if I can avoid it.	1	2	3	4	5
9. Sometimes in elections I vote for candidates I know little about.	1	2	3	4	5
10. I am sometimes irritated by people who ask favours of me.	1	2	3	4	5

LINGUISTIC IMPLICATIONS FORM

Something that people say are redundant, in that one or more words in a sentence can be guessed from knowledge of the remainder of the sentence. The purpose of this session is to "collect some basic statistics on the redundancy of a series of standard sentences.

Each sentence contains a blank and you are asked to choose the most appropriate word from among three alternatives for each blank. You may notice that the alternatives were technically correct, but that a close analysis of each sentence might reveal that one alternative was more likely to occur in that context than others.

Please encircle the word which you think is most appropriate to fill the sentence. Do it quickly, your first reaction is the best.

1. **After spreading fertiliser liberally over the flower bed, (I , she , we) watered the flowers.**
2. **Although (their , our , my) personal library consists of only few books, some of them are classics.**
3. **Please don't do this to (me , her , us), it is just not fair.**
4. **At first it didn't seem to make any difference, but by later that night the noise from the party was entirely too loud to allow (us , her , me) to sleep.**
5. **It isn't easy to get lost in this town, but somehow (I , we , they) managed it.**

SELF-CONSCIOUSNESS SCALE (SCS)

Please encircle a number next to each item indicating the extent to which that item is characteristic of yourself, according to the following scales:

1 = Extremely Uncharacteristic
2 = Slightly Uncharacteristic
3 = Neither characteristic nor uncharacteristic
4 = Slightly Characteristic
5 = Extremely Characteristic

1.	I'm always trying to figure myself out.	**1**	**2**	**3**	**4**	**5**
2.	I'm concerned about my style of doing things.	**1**	**2**	**3**	**4**	**5**
3.	Generally, I'm not very aware of myself.	**1**	**2**	**3**	**4**	**5**
4.	It takes me time to overcome my shyness in new situations.	**1**	**2**	**3**	**4**	**5**
5.	I reflect about myself a lot.	**1**	**2**	**3**	**4**	**5**
6.	I'm concerned about the way I present myself.	**1**	**2**	**3**	**4**	**5**
7.	I'm often the subject of my own fantasies.	**1**	**2**	**3**	**4**	**5**
8.	I have trouble working when someone is watching me.	**1**	**2**	**3**	**4**	**5**
9.	I never scrutinise myself.	**1**	**2**	**3**	**4**	**5**
10.	I get embarrassed very easily.	**1**	**2**	**3**	**4**	**5**
11.	I'm self-conscious about the way I look.	**1**	**2**	**3**	**4**	**5**
12.	I don't find it hard to talk to strangers.	**1**	**2**	**3**	**4**	**5**
13.	I generally pay attention to my inner feelings.	**1**	**2**	**3**	**4**	**5**
14.	I usually worry about making a good impression.	**1**	**2**	**3**	**4**	**5**
15.	I 'm constantly examining my motives.	**1**	**2**	**3**	**4**	**5**
16.	I feel anxious when I speak in front of a group.	**1**	**2**	**3**	**4**	**5**
17.	One of the last things I do before I leave my house is look in the mirror.	**1**	**2**	**3**	**4**	**5**
18.	I sometimes have the feelings that I'm off somewhere watching myself.	**1**	**2**	**3**	**4**	**5**
19.	I'm concerned about what other people think of me.	**1**	**2**	**3**	**4**	**5**
20.	I'm alert to changes in my mood.	**1**	**2**	**3**	**4**	**5**
21.	I'm usually aware of my appearance.	**1**	**2**	**3**	**4**	**5**
22.	I'm aware of the way my mind works when I work through a problem.	**1**	**2**	**3**	**4**	**5**
23.	Large groups make me nervous.	**1**	**2**	**3**	**4**	**5**

COMPUTER ANXIETY RATING SCALE (CARS)

Please encircle a number next to each item indicating the extent to which that item is mostly like you.

1 = Strongly disagree
2 = Slightly disagree
3 = Neither disagree nor agree
4 = Slightly agree
5 = Strongly agree

		Strongly disagree				Strongly agree
1.	I feel insecure about my ability to interpret a computer printout.	1	2	3	4	5
2.	I look forward to using a computer on my job.	1	2	3	4	5
3.	I do not think I would be able to learn a computer programming language.	1	2	3	4	5
4.	The challenge of learning about computers is exciting.	1	2	3	4	5
5.	I am confident that I can learn computers skill.	1	2	3	4	5
6.	Anyone can learn to use a computer if they are patient and motivated.	1	2	3	4	5
7.	Learning to operate computers is like learning any new skill - the more you practice, the better you become.	1	2	3	4	5
8.	I am afraid that if I begin to use computers I will become dependent upon them and lose some of my reasoning skills.	1	2	3	4	5
9.	I am sure that with time and practice I will be as comfortable working with computers as I am in working with a typewriter.	1	2	3	4	5
10.	I feel that I will be able to keep up with the advances happening in the computer field.	1	2	3	4	5
11.	I dislike working with machines that are smarter than I am.	1	2	3	4	5
12.	I feel apprehensive about using computers.	1	2	3	4	5
13.	I have difficulty in understanding the technical aspects of computers.	1	2	3	4	5
14.	It scares me to think that I could cause the computer to destroy a large amount of information by hitting the wrong key.	1	2	3	4	5
15.	I hesitate to use a computer for fear of making mistakes that I can not correct.	1	2	3	4	5
16.	You have to be a genius to understand all the special keys contained on most computer terminals.	1	2	3	4	5
17.	If given the opportunity, I would like to learn about and use computers.	1	2	3	4	5
18.	I have avoided computers because they are unfamiliar and somewhat intimidating to me.	1	2	3	4	5
19.	I feel computers are necessary tools in both educational and work settings.	1	2	3	4	5

PSYCHOMOTOR TASKS

Here are two tasks, please work each **as quickly as you can.**

1) List Number Forward

Please list the numbers forward from 103 by 1s.

2) Letter Cancellation Task

Please put an individual, vertical line through each letter in the table below.

A	V	B	T	D	J	H	I	U	O	P
K	Q	W	E	R	T	Y	U	I	Z	X
C	V	B	N	M	P	L	M	N	K	O
I	J	B	V	H	U	C	G	Y	X	F
T	R	D	X	Z	S	E	W	A	Q	H
T	G	B	E	K	U	G	H	O	D	W
D	J	H	I	U	M	P	L	M	N	K
N	M	P	L	M	N	K	O	X	Z	S
E	U	G	H	O	D	W	A	V	B	T
E	R	T	Y	U	I	Z	X	W	A	Q
A	V	B	T	D	J	H	I	U	O	P
K	Q	W	E	R	T	Y	U	I	Z	X
C	V	B	N	M	P	L	M	N	K	O
I	J	B	V	H	U	C	G	Y	X	F
T	R	D	X	Z	S	E	W	A	Q	H
T	G	B	E	K	U	G	H	O	D	W
D	J	H	I	U	M	P	L	M	N	K
N	M	P	L	M	N	K	O	X	Z	S
E	U	G	H	O	D	W	A	V	B	T
E	R	T	Y	U	I	Z	X	W	A	Q

COMPUTERISED COGNITIVE TASKS

Three computerised cognitive tasks were employed in the experiment reported in Chapter 6. These include the counting speed task, digit span task, and the memory task. The software design has been reported as in Chapter 3.
The instructions and task materials for these tasks are represented as follows:

Counting Speed Task

Note. This task contains two sets of material to be administered before and after the Velten Mood Induction Procedure.

INSTRUCTIONS

Shortly, the computer will present you a matrix of letters. The matrix contains several different kinds of letters. The task requires you to count how many letter "O" are in this matrix.
To respond, you may use the number keypad on the right of the keyboard.
Please respond quickly and correctly.

MATERIALS

Before the VMIP.

O Z I R W F P A F O T P T D E
C W O J V C V O V L N Z O Y D
V U Z M O T Y A O A V J B E X
D E O K Z G O X Y N H X T H O

After the VMIP.

V O Z M U T Y A Z O V J B E X
C W Z J E C V O V L N Z O Y D
D E O K Z G O X Y N H X T H O
O W C J V C V O V L N Z Y O D

Digit Span Task

INSTRUCTIONS

Several series of digits will be presented by the computer. Each set of digits will begin with the sign "START", followed by one digit at a time, and end with a beep sound.

You are required to recite the series of digits FORWARD. For example, if the computer presents "3" "8" in sequence, the correct answer to type in is "38".
To respond, you may use the number keypad on the right of the keyboard.

MATERIALS

Note. The series of digits in the bracket was used if subjects failed to recall the first series of digits correctly.

582 (694)
6439 (7286)
42731 (75836)
619473 (392487)
5917428 (179386)
58192647 (38295174)
275862584 (713942568)

Memory Task

INSTRUCTIONS

Shortly, the computer will present you a list of words one by one. Please try to memorise as many words as you can.
At the end of this experiment, you will be asked to recall the words you remembered.

MATERIALS

novel	bear	television	apricot
sword	trailer	helpful	bold
hostile	chisel	unconventional	mean
vanilla	pleasant	ungrateful	rock
thoughtful	cautious	jacket	kind
shy	cruel	sincere	excitable
impolite	brick	proud	rude
carbon	considerate	eagle	game
petunia	zinc	grasshopper	engineer

APPENDIX II

Instructions and statements for the Velten Mood Induction Procedure

INSTRUCTIONS OF THE VMIP

Please read the instruction carefully.

Shortly the computer will present me with several statements. I will read it to myself and read it aloud. The statements represent a mood state. In order to participate fully and successfully, I will need to be willing to feel and experience each statements as it would apply to me personally. In other words, when I read each statement, I will allow myself to respond as though the statement had been my own original thought. I will go with the feeling and not try to stop it.

At first I might feel like resisting the mood. However, I will see that it is the case that I have the opportunity to learn to talk myself into a mood, and obviously, I will also learn how to talk myself out of one. When this happens, I will find that I have learned something valuable about myself: I can learn to control my moods. Thus, I will try to experience the mood suggested.

I will feel each item, making the statement my own. I will experience the mood suggested and will not attempt to stop it. I will visualise a scene in which I have had such a feeling or thought. Then I will begin to say whatever comes to my mind that relates to the feeling. This is a type of free association - letting thoughts that pertain to the feeling flow freely.

I am now ready to experience the statements that follow. From this point forward whenever I hear the tone and a sign on the computer, I will go on to the next statement by clicking the mouse. However, I may stay as long as I wish for each statement. I will spend the time between the tones reading the statements and experiencing the feelings they suggest to me. I am ready to begin.

STATEMENTS OF THE VMIP

The world is full of opportunity and I'm taking the advantage of it.
I know if I try I can make things turn out fine.
I bet things will go well for the rest of the day.
When I have the right attitude, nothing can depress me.
Most people like me.
I've got some good friends.
I can make things happen.
My parents brag about me to their friends.
I know I can get the things I want in life.
My future is so bright I've got to wear shades.
I feel creative.
Nothing can bum me out now.
Things look totally awesome.
The relationships I have now are the best I've ever had.
It doesn't get any better than this.
I can make any situation turn out right.
I feel completely aware.
I'm in charge of my life and I like it that way.
Life's a blast. I can't remember when I felt it so good.
I am going to have it all!
When it comes right down to it, I'm just too cool.
I know I can do it; I'm going to seize the day.
I'm energised.
It's great to be alive!

PROCEDURE OUTLINE FOR THE P&P CONDITION

Instructions

The experiment concerns the effect of mood on memory for word lists. The experimental procedures are outlined as below.

Procedure Outline

Please follow the procedures by sequence.

1. **Mood Assessment Questionnaire**
2. **Linguistic Implications Questionnaire**
3. **Memory Tasks**
4. **Mood Induction Procedure**
5. **Mood Assessment Questionnaire**
6. **Questionnaires**

After you complete the first Mood Assessment and Linguistic Implications questionnaire, please hand it to the person who is overseeing this session.

The Memory Tasks and Mood Induction Procedure are run on the computer. As the experiment concerns, your full involvement with the mood induction procedure is very important.

After the Mood Induction Procedure, please fill the mood assessment questionnaire at first and then other questionnaires. All of them can be found on the table.

In order to keep the records confidential, you have an ID number assigned for this experiment. Please remember to print it on all the questionnaires.

The whole procedure will take about 20 minutes. If you have any query about the procedures or encounter problems during the procedures, please go to see the person who is overseeing this session.

PROCEDURE OUTLINE FOR THE CBT CONDITION

Instructions

The experiment concerns the effect of mood on memory for word lists. The experimental procedures are outlined as below.

Procedure Outline

Please follow the procedures by sequence.

1. **Mood Assessment**
2. **Linguistic Implications Form**
3. **Memory Tasks**
4. **Mood Induction Procedure**
5. **Mood Assessment**
6. **Questionnaires**

All the procedures are run by the computer except the questionnaires at the end.
As the experiment concerns, your full involvement with the mood induction procedure is very important.
After the second Mood Assessment (Procedure 5), please fill questionnaires which can be found on the table.

In order to keep the records confidential, you have an ID number assigned for this experiment. Please remember to print it on all the questionnaires.

The whole procedure will take about 20 minutes. If you have any query about the procedures or any problem occurs during the procedures, please go to see the person who is overseeing this session.